LA

4-10 August 1983 Vol 2 No 31

Microdrive

Exclusive photographs of both inside and outside of the ZX Microdrive and interface 1. See page 13.

Printer interfaces

Stephen Adams reviews a range of printer interfaces for both the ZX81 and Spectrum on page 14.

Commodore 64

David Lawrence and Mark England explain how to master machine code on the Commodore 64 in the first of a new series. See page 29.

New releases

All the latest software games including Warrior from ISCA Software and Cosmic Fire Birds from Solar Software. See page



News Desk

Spectrum tops

SINCLAIR has announced that sales of the ZX Spectrum in the UK and Europe have now exceeded 500,000.

This is an average of more than 6,500 a week. Of the two models available, the larger memory version has dominated - with the 48K outselling the 16K by about two to

On breaking the half-million barrier, Sinclair's managing director Nigel Searle said: "Of course, we are delighted. And we hope that peripherals like the ZX Microdrive, ZX the announced last week, and the Rom cartridge software we aim to publish in the autumn. will keep that user group challenged by their Spectrums."

The Spectrum has, in fact, been more successful than the ZX81 comparing corresponding 16 month periods from launch. The ZX81 sold just over 400,000 units for the period to July 1982.



Home turn-on for Aquarius

A UNIQUE computer add-on has been announced by Mattel for the Aquarius home computer, which will enable the machine to control household electrical appliances.

Called the Home Control System it allows lights, central heating, or any other mainsoperated device, to be operated remotely at predeter-mined times, without any: additional wiring having to be installed.

It works by using a special control unit which plugs into any mains socket which then communicates with appliances, each connected using special plugs, by sending highfrequency coded signals through the existing mains wir-

To set up the system to switch on or off a particular appliance at a particular time the Home Control Unit has to be programmed - using an Aquarius microcomputer.

The unit — a small device about the size of a thick paperback book - plugs into the

Continued on page 5

Classified

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer. Ring 01-930 3266 and give us the details.

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VIC20. Rat Race, Jelly Monsters for sale, £10 each. Also got games swap. Tel: Stevenage 0438 58288.

Continued on page 40







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Selected Microdeal Games are available from Boots and John Menzies Stores with Computer Centres and Dragon 32 Dealers Nationwide or order direct from: DEPT (WE)

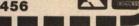
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All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekily cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

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Editorial

What makes a good computer game? There is no simple answer, since people's tastes differ, but there are a number of qualities that seem to be present in most successful games.

One of the most important elements in computer games is their addictiveness. The desire to play a game again and again is a hallmark of its quality. Any game which elicits the response "Just one more go and I'll get on to the next level ... set a new hign score ..." is likely to be successful.

As a corollary to the quality of addictiveness, good computer games tend to be progressive, ie, they get harder as they go along. A game which only has one level of play tends to become boring as soon as you have mastered it.

Another important element in judging the quality of a computer game is its simplicity. This is not to say that sophisticated games are bad, just that they should be easily comprehensible.

Funnily enough, all of these qualities depend on the design of the game, rather than the programming skill which goes into it. Even the most amazing use of graphics and sound will find it hard to rescue a poorly designed game.

Perhaps the key to designing a good computer game is the recognition that it requires both programming knowledge and an understanding of the mechanics of game construction.

Next Thursday

Manoeuvre the green blocks around the screen and try and get the sun down to the bottom. But don't let the clouds fall through the gaps. Sunfall for the 16K or 48K Spectrum by Jonathan Medhurst.

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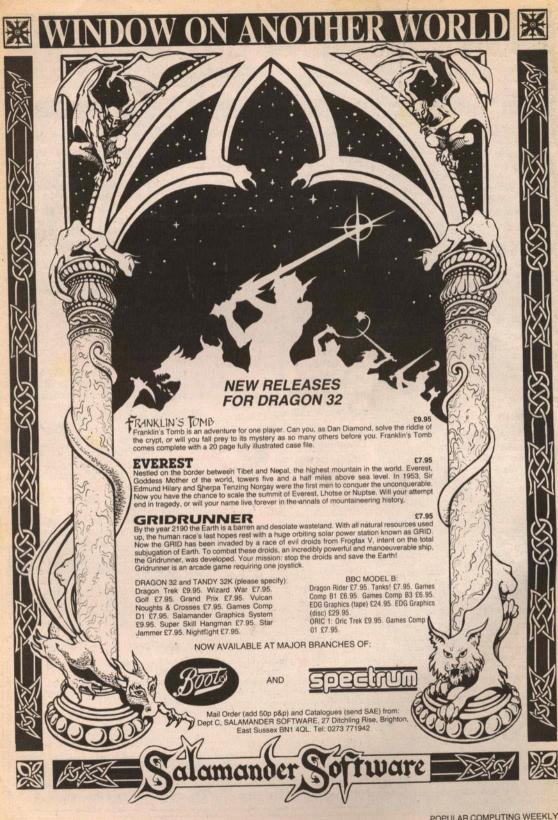
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Bundles of ZX81 starter packs

SINCLAIR is now doing to the ZX81 what Commodore has done to the Vic20.

As of August 1, the machine will be available as part of a special package deal. This Sinclair Starter Pack, as it is called, will include a ZX81, a 16K Ram pack and one software cassette — all for £45.

This price is a £30 saving on the cost of buying the three components separately. To begin with, the software cassette on offer will be Psion's Backgammon title. But other titles will be available as well, with shops receiving a random selection.

The reason for the deal is that the price drop of the ZX81 earlier in the year to £39.95 has failed to revive flagging sales of the machine.

Initially, the offer will run for two months and the Starter Packs will be available from most usual stockists, including Boots and John Menzies.

In another offer, running concurrently with the Starter Pack scheme, Sinclair is offering a free pack of five rolls of printer paper with every ZX Printer sold between now and the end of September.

Just a war game

WARGAMES, which opens in London this week is the latest film to be inspired by the micro.

Its teenage hero, David Lightman, has one interest in life — the world he can access over the telephone lines with his home computer. But, along the way he accesses the American defence system — and the game he has found that seems like Space Invaders is in fact a whole lot more!

Aquarius

Continued from page 1

mains and also connects to the cassette port on the computer. A Rom cartridge provides the programming software, to set up the codes of each appliance to be controlled, and to set on and off times. For lights there is also a dimmer facility. Having programmed the unit, the Aquarius is no longer needed and can be disconnected.



Up to 256 appliances can be controlled from the system, each being programmed with up to 32 on/off events over a seven-day cycle.

The Home Control system has been developed by BSR/Pifco in Scotland in conjunction with Mattel. It is expected to go on sale in early 1983 and prices will be around £100 for the controller and software, and around £10 for each of the special plugs needed for each appliance.

Frightening, but not impossible. Last year, three New York school children used their computer to crack the code used by Pepsi Cola to control its Canadian freight movement. In a few days they had placed huge orders from fictitious companies and delivered empty bottles to subsidiaries all over Canada.



The 'joke' cost Pepsi a fortune and, when the culprits were eventually tracked down by the Californian police and the FBI, the three — being minors — escaped prosecution.

For a more weighty discussion of such real-life incidents see Computer Insecurity by Adrian Norman, published by Chapman and Hall.

Memory expansion

QA Data Systems has announced a mother-board and memory expansion module for the TI 99/4A machines.

The unit, which plugs into the data bus at the side of the machine, has 32K, four expansion sockets and its own power supply. The module will be available in August at a price of around £200. This compares with an equivalent package from Texas Instruments costing £159.95 for a 6-slot motherboard and power supply plus a further £159.95 for a 32K Ram expansion.

QA Data Systems can be contacted at 9 St Georges Street, Chorley, Lancs.

Dragon and Oric dumps

PROGRAMS to allow users to make high-resolution screen dumps to a printer are now available for both the Dragon and Oric.

The Dragon program is from Caveman Computers, costs £7.95 and works with the Seikosha GP100A and Tandy DMP100 printers, with an Epson version to follow.

The Oric package is from Peach computers and comes in two forms — producing either a 40 or 80 character per line high-resolution dump of the Oric's 240 × 200 screen. Both versions cost £5 and should work with most Centronic interface type printers, including the Epson range.

Contact details: Caveman Computers, 55 Iona Road, Windy Nook, Gateshead, Tyne and Wear, and Peach Computer, 192 Greenock Road, Largs, Ayrshire.



Cards on the table



U-COMPUTERS – better known for its plug-in cards for the Apple – has now turned its hand to the Spectrum.

To begin with the company has produced a 3-slot buffered expansion board (£35.65) and a 4-slot extension board – allowing a maximum of seven additional boards to be connected.

Among the expansion cards being offered is a dual R\$232 board (£34.50) and a generalpurpose parallel port board (£29.90).

A further five cards are still at the design stage.

Details from U-Computers, Winstanley Industrial Estate, Long Lane, Warrington, Cheshire.

Two more CBS deals

CBS Records has announced two more distribution deals in addition to its Quicksilva deal announced last week (see Popular Computing Weekly, July 28).

CBS has now agreed to distribute software produced by Virgin Games and Rabbit Software.

Court moves for Commodore

COMMODORE is considering taking legal action against the General Hardware Company which is selling a device to allow Rom cartridge software for the Vic20 to be broken into and copied (see Popular Computing Weekly, July 14).

A spokesman said: "We are very concerned and the matter has now been referred to our solicitors who are considering the next move."

Possible court action has

been made considerably easier by a legal precedent set earlier this year in the business sector. Dataview successfully challenged FAW Electronics which was manufacturing a switch — Masterkey — which could be encoded to disable Dataview's dongle software protection code. The breakthrough came after Dataview claimed that the dongle-breaker had only one use: "to induce a breach of contract between supplier and customer."

YEP FOLKS - IT'S HERE

AVAILABLE NOW

Spectrum 48K Dragon Com. 64

CALIFORNIA

GOLD RUSH

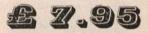
HOWDE DO PARDNERS

This here's Prospector Jake, I sure am havin' one helluva time tryin' to peg ma claim with those damned Injuns a hootin' an a hollerin' all over this territory. Ma job gets harder as I move from one Gold Field to another. I know, that is me an' ma stubborn hornery ol' Mule here know of 24 rich an' I mean rich seams of pure Gold. All it needs to make this here ol' critter happy is that you help me peg every doggone last one of them claims.

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A fifth level

Did all you 48K Spectrum owners know that the game Penetrator has a fifth level? It seems when in the training mode the computer asks "level (1 to 4)". I entered 5 and found a new sheet.

At one point in this sheet there is an impassable mountain which always destroys your ships, but there is also a way of getting 1000 extra points. Maybe this sheet was written and, because of a bug, discarded. I'll keep you guessing about the 1000 points.

Steven Wilson 64 Sudbury Court Drive Harrow Middx HA1 3TD

Paying the price

May I take the opportunity to reply to Ziggurat in PCW 14 July, Vol 2 No 28 issue?

Mr Allan went to great lengths to complain about the cost of software in relation to the cost of blank cassettes. As a producer and seller of software, we can appreciate his point of view, given the price of software and blanks available over the counter. To the end user, the £5 or so must seem a bit of a rip-off. In fact, this same attitude was the catalyst in the formation of our own company, and many like

Now let us examine the facts as they exist and not just the end prices. Tape duplication - this is the first point at which the software house incurs expenses. Most duplicators will charge for tape mastering: This can cost anything from £15 to £40 or even more. For this, the duplicators make a copy, by various means, of the tape you supply to them. Most of the 'reputable' duplicators also have minimum run requirements, which on a new title becomes a possible liability to the software house - this will become clearer later on.

OK, so now we've got the mastering charge, and, surprise, surprise, carriage charges for delivery of the duplicates. Next on the shopping list are labels. Unfortunately, the end user is solely to blame for this aspect, as they are unwilling to buy software which is packaged as cheaply as possible. We have experience of this, and have had to introduce full colour, double flap, cassette inlays.

Here is where the cost hits RAMtop — 'readily available money'. To produce the inlays which the customer expects, commercial artists are set the task of producing artwork, after which printing plates must be made. These plates, one for each of the four colours used, are made of metal and produced by a photographic etching process, very specialised and very expensive.

Next comes the actual printing. It is true that the cost of a label is small, but this is only for the printing. The average cost for actually taking the plates from a drawer and fixing them into a printing press is about £300.

OK, now we have inlays and duplicated cassettes. Next, we need labels on the cassettes themselves, these being printed with title of program, company logo, machine type, etc. There will be a cost for producing the artwork and minimum runs.

If your bank balance is still alive, you now have a finished and saleable article — not so fast! Who in their right mind is going to buy your software, when they can open any magazine and see nice full colour, full page advertisements for the ultimate playable software of the "universe" available from the large chain stores — it must be good!

So it's obvious that advertising will play an important role in the success of your software.

Advertising is not free—the average cost of a quarter page advertisement in black/white is £130-£160 per insertion (week, month). Colour advertising is astronomical.

So now we are advertising, but users still cannot buy it over the counter. So, you must rely on retailers seeing the advertisement, mail order, and your trusty GPO telephone to muster sales. To get known by the retailers and wholesalers, you must now give away your software as samples — some return eh!

You can disregard the retailers to some extent, as they prefer to buy from whole-

salers. So, let's concentrate on the wholesalers. They will require something like 50-60 percent discount, so after all this the £5 cassette is only worth £2.50 to you, less all the other expenses and less all the freebees you've given away, postage of samples and review copies, which are never reviewed, etc.

I have not yet mentioned travelling the country attending computer fairs and exhibitions, where stands can cost anything up to £500 (plus VAT).

And, if you don't get your software into the big chain stores, then your overpriced software, which only represents the cost of a blank, will never get into the 'Top Ten', and must therefore be below the standards set by the cheque books of the 'big boys'.

If the buyer would purchase plain, wrapped, unadvertised software by mail order for £2, then it would become available. But they won't, so they must pay the price for being wooed by exciting inlays, colourful advertising and over the counter availability.

D Wieckowski Elephant Software 41 Haymill Road Burnham Berkshire SL1 6NE

Cured eye strain!

I would like to thank Brian Cadge for his Dragon screen invert program (PCW, July 14)—eye strain cured at last!

I now load this program, on start-up, as a matter of course. Such constant use has revealed a minor problem: any attempt to execute a *Get* command, with the code in memory, results in a *Syntax Error*; at least, this happens on my Dragon.

The following changes will give a green on black screen on Running: change 'D' in line 30 to '5', and change checksum in line 60 to '17097'.

I've also found the following additions of benefit:

80 PRINT "INVERTER-COURTESY OF BR IAN CADGE" 85 PRINT@32, STRING\$ (8,188)

99 PRINT:PRINT "ORANGE TEXT IS AL SO AVAILABLE" 95 PRINT "DO YOU REQUIRE

THIS? (Y/N)"

100 X\$ = INKEY\$:IF X\$ = ""THEN 100

110 IF X\$ = "Y" THEN POKE 32644.13 115 PRINT:PRINT "THE BASIC PROGRAM WHICH LOADED INVERTER IS NO LONGER NEEDED. 187 BYTES ARE RE-SERVED AT RAMTOP"

120 PRINT:PRINT "MAY I DELETE PROGRAM? (Y/N)" 130 Z\$ = INKEY\$:IF Z\$ = "" THEN

130
140 IF Z\$ = "Y" THEN CLS:NEW
150 PRINT:PRINT "AWAITING INSTRUCTION"

Dave Vaughan 105 Tollohill Drive Kincorth Aberdeen

300,000 in seconds

160 END

I am writing to tell you of a bug I have discovered in Microdeal's Donkey King program for the Dragon 32—you can get 300,000 points in a matter of seconds.

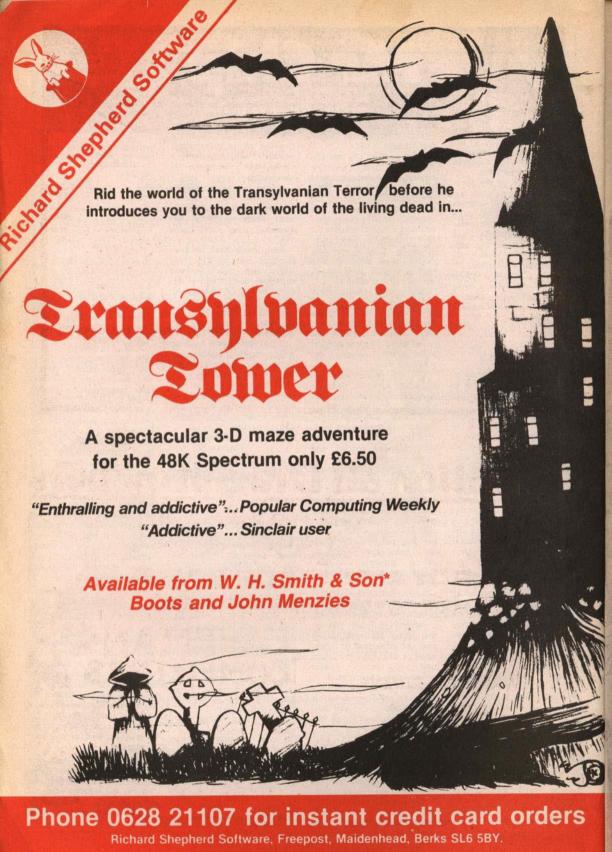
All you have to do is, when your first man appears, have your button already pressed and your joystick pointing right. Jump until you are just before the second ladder and then climb it. Take one further jump to grab the hammer and fall off the end. When your next man appears you will have exactly 300,000. This only works with player 1's first man.

Also, I would like to ask about the rates paid out by software companies as I am now just finishing my own game loosely based on Galaxians called Datacc. It is in machine code with full sound, saveable hall of fame and nine colour graphics in Alphasemigraphics mode 24.

Stephen Quail 158 Parkhills Road Bury Lancs

Typically, you can expect to receive either a flat-rate cash fee, or a royalty payment. The royalty may vary according to sales, but should be in the region of 7-12½ percent of the retail price. If you are offered a massively larger royalty, it will be at the expense of a proper marketing and promotional campaign.

NB: When you submit your game, I would include a clause in the letter stating that you reserve the right to offer the game elsewhere if you do not receive a reply within three weeks.



Dealer enquiries welcome * Selected computer branches only

Mr Chip

SOFTWARE

VIC20 GAMES AND UTILITIES

BUGSY (Joystick Only)

This is a Minefield with a difference as you step on the stones while collecting This is a Minerical with a difference as you step in the states while exceeding purple boxes which give you both time and points, they disappear from beneath your feet. DO NOT DESPAIR! "Bugsy" will randomly replace the stones but avoid bumping into him or it's sudden death! An original compulsive and £5.50 challenging game

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A new game for Dragon 32 by Kevin Whitley

Marshy Maze for the Dragon 32 is an exciting maze-type game. The objective is to guide your man along paths in the maze, with the help of a joystick, to enable you to reach home. But, if you stray from the path and enter the marsh you will be eaten by crocodiles and lose a life.

You have a total of 12 lives with which to complete four different mazes. Each maze is more difficult than the preceding one.

Just to make things more difficult, you only have a limited amount of time in which to complete each maze. Again, if you fail to complete a maze inside your allotted time, you lose a life.

NB Lower case letters in the listing denote inverse characters.

Lines 1-7 Goto instructions 8-20 Set up variables 50-240 Set up first maze 500-670 Set up second maze 1000-1210 Set up third maze 1500-1710 Set up fourth maze 2000-2050 Goto movement

2052-2055 Check if you made it 2060-2080 Check timer Returns to Movement 2090-2500-2840 Movement

4000-4030 Prints you have fallen into the marsh 4200-4250 Prints men left 4300-4330 Prints ran out of time

4500-4550 Prints you succeeded on this maze Returns to print maze

Checks timer for screens one, two and

4700-4800-4870 Prints no men left 5000-5060 Prints you succeeded all the mazes 8000-8010 Checks timer for screen four

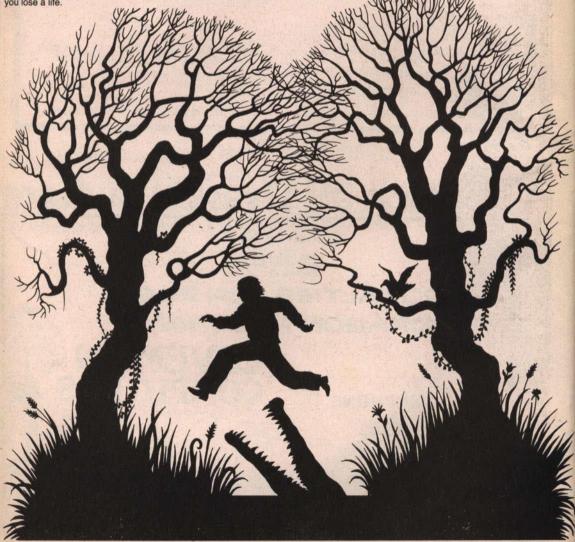
> three Prints instructions

Variables

9000-9010

S = Scores M = No of lives X = Maze No

\$1,52,53,54 Current scores Maze blocks Position of player



```
1 NOT 14100000 NOTES 13
2 NOT 141000000 NOTES 13
2 NOT 141000000 NOTES 14
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4-10 AUGUST 1983

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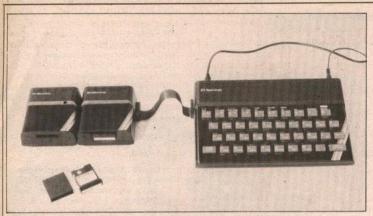
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MICRODRIVE



Up to eight Microdrives may be connected to a single Spectrum, complete with ZX Interface 1, for a total capacity of 680K bytes.

The Microdrive was officially launched in London last Thursday, but it will not be available in the shops for some months vet

Mail-order Spectrum customers have already been sent letters about the Micro-

drive — the earliest customers have even been sent order forms.

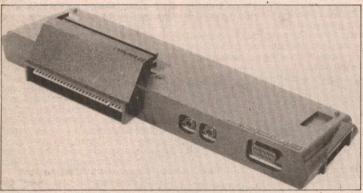
Manufactured by Thorn EMI Datatech, the Microdrive costs £49.95 and includes a free demonstration cartridge. The ZX Interface 1 costs £29.95, if purchased with a



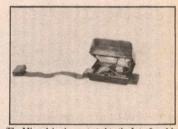
Each Microdrive cartridge (shown here with case) can store up to 50 files — with an access time of 3.5 seconds.

Microdrive — £49.95 if bought on its own. Blank cartridges, at £4.95 each, are rather more expensive than originally suggested.

The Microdrive/Interface 1 manual is available now and can be bought separately for £5, including VAT and post and packing.



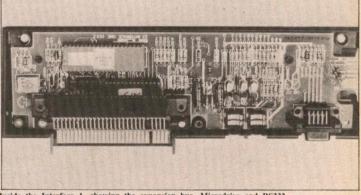
The ZX Interface 1, which fits underneath the Spectrum, operates at all standard baud rates up to 19,200 with speed software selectable.



The Microdrive is connected to the Interface 1 by a Microdrive lead. Powered by the Spectrum's power supply, a red indicator light shows when the Microdrive is running.



Mircodrive designers: (clockwise from bottom right) David Southward, Martin Brennan, John Williams and Ben Cheeze.



Inside the Interface 1, showing the expansion bus, Microdrive and RS232 connectors.

Printed information

Stephen Adams looks at a range of printer interfaces for both ZX81 and Spectrum

All the interfaces reviewed here are based on a standard set for centronics printers. This is a method of connecting up a parallel port and a printer to send eight bits of information at a time.

The interface to the printer has a common plug (a 36-way Amphenol type plug) which carries eight data lines, Strobe, 0 volts, various protection earths and control signals. The other end of the ribbon cable, which connects the two, may be completely different depending on how many of the extra lines are used or checked by the interface. This means that any centronics standard printer may be plugged into the interface, but that some of the extra features of the printer may be unobtainable, eg, Paper empty, Initialise, Error detection, etc.

The connections to the printer include a Strobe line which is used to indicate to the printer when data is ready for collection (see Figure 1). Every time this line goes to 0 volts, there is a new set of data bits on the data lines for the printer. Two further connections are used by the printer to signal to the computer that it cannot accept any more data.

The printer is a very slow device compared to the speed of the computer — it is necessary to check that the transfer of data continues at the speed which the printer can accept. This method of telling the printer when data is ready (via the Strobe line) and the printer telling the computer when it can or cannot accept any more data (via the Busy or Ack lines) is called handshaking.

The Busy line goes to +5 volts immediately on receiving the first Strobe pulse and only returns to its normal state (0 volts) when all the printing operations have finished. If the computer contains a Ram chip as a buffer, to store incoming data before printing, the Busy line will

revert to its normal state quicker as the data is printed later.

The Acknowledge line goes low for a short time at the end of the printing period. Therefore, the computer has to constantly monitor this signal, as it will only be there for a short period of time and does not change immediately data is sent. This is one of the reasons that the Busy line is often the only line checked by the interface software. See Figure 2 for details.

All of the printers that use the centronics standard also have another common feature — the Ascii character set. This defines the letters, numbers and symbols used inside the printer from 0 to 127. Codes 128 to 255 are ignored by the standard, but many of the printer manufacturers have used the codes from 128 to 255 (the maximum number on an eight bit byte) to implement graphics and other features.

The character codes from 0 to 31 also have special significance, as they are used to control the printer mechanism itself and are called control codes. These do things like double height or width characters, underlines, high-resolution graphics and a host of other tricks. Again, these are not exactly standard and must be put out by the software controlling the interface.

The same character codes may be completely different inside the computer, so the printer software often has to make restrictions on the sort of code it can handle. The ZX81 printer interfaces also

have to convert the ZX81 character set to Ascii. The software is often stored on tape, which means that it must be run in before the programming session starts. But, once there (assuming no crashes occur requiring the user to reset the machine), it will not need to be *Loaded* with every program.

The software is usually stored above Ramtop at the top of memory — you must ensure that this does not clash with your own programs. No problem should be experienced with the Memotech (ZX81) or Euroelectronics interfaces, as both are Rom based in an area unused by the basic system.

Three commands are built into Basic for use with the printer — *Lprint* which prints out characters contained within the inverted commas, *Llist* which automatically goes through the program listing the lines on to the printer and *Copy* which makes a complete dot by dot copy of the image of the screen on to the printer.

Any formatting of the printed page must be done through the *Lprint* command (new line, double width, etc).

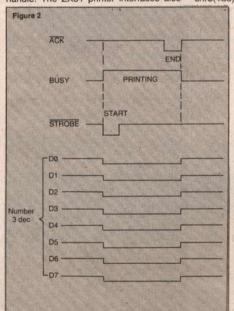
The Memotech interface comes in the same package as their Ram packs, with a socket at the back to take a 34-way IDC (insulation displacement connector) plug. Pin one is identified by a coloured stripe on the wire. The ribbon cable has to go under any of the other Ram packs etc to the printer. The only other signal beside Busy and Ack is the Error signal. The interface is based on the Seikosha GP100 printer.

The software is placed in a 2K Rom starting at 10K, so the 64K Ram pack is limited to 48K with this device. This interface can only handle text (letters and numbers) and not graphics, as anything outside this range must be prefixed by a chr\$(155) which is an inverse dot.

An alternative to prefixing everything with chr\$(155) is to put control characters into a Rem statement at the beginning of the program and calling the interface direct by using *Lprint* chr\$(6). No characters outside the range 0-127 may be sent to the printer.

The instruction booklet that comes with the interface is very good, but not infallible. The user will have to write a lot of control characters in his program to get it to be anywhere near as useful as the Sinclair printer. But, this printer does have two advantages — one, that no software needs to be Loaded before using it, and two, that all the commands use the same Basic commands as Sinclair.

To use the Pericon c module, you must first have bought the Persona and a Ram pack (at least 16K) from Basicare, as it is not compatible with any other part of the system except the computer. The module comes with a tape which allows you to



change the type of printer from Seikosha to an Epson for the graphics print-out. All of the printer commands are via *Usr* (address) calls to the machine code above Ramtop. Instead of using machine code, you can *Poke* the number of the character you want into the port at address 48129 and check the signals from the printer (Busy Ack, Paper empty and Select) on

printer or on the Listed line. This tends to make a mess of listings.

The "lazy man's" printer interface, it has the advantage of being there when you switch on (no tape to *Load*), but it is inflexible about graphics, CR, etc, so the user will have to write routines in Basic or machine code to get round this. It is also expensive.

The Kempston interface was one of the first to arrive on the scene for the Spectrum and provides all the facilities of Lprint and Llist via a short machine code routine. This routine can be "customised" by a Basic program supplied to suit any type of printer. All the output codes can be changed and, as gra-

phics are not printed, you can redefine them to print as spaces (for filling in later on by hand).

The machine code is located above. Ramtop and is Loaded in by using Code after modifying it with the Basic program. This saves memory, as only the machine code needs to be Loaded. Both 16K and 48K versions are provided on the one tape. Tasword is one word-processing program which uses this interface to print

out on a full-sized printer.

A very useful interface, very flexible and simple to use. Most non machine code programs will run without any alterations using a full-sized printer.

The Morex interface has both centronics and RS232 interfaces-which drive printers and other equipment. The centronics side works very well and includes a *Copy* command called by *Rand Usr.* Software is fully explained and again run in from tape above Ramtop. You can set the CR/LF option via a *Poke*, but not line length. Graphics, etc, are printed as "?".

Much of the explanation in the instructions refers to the RS232 input and output port, which I could not get going with a printer. It is supposed to allow you to transmit and receive between 4800 and 50 baud, giving you a wide range of speeds.

This would be well worth buying if you were thinking of using a printer and moderns or other devices using the RS232, as you get two devices in one.

Hilderbay wrote the software for Kempston's printer and has decided to bring out its own version of the interface with some more software. In a different box to Kempston's, but with the same "customising" software, plus a free word processing tape, Hilderbay's interface is just as useful as Kempston's.

A good product backed-up with good software and service. It is flexible enough to be incorporated into most programs.



port address 48130.

The Lprint is implemented by filling up string B\$ with your message, which is then converted to Ascii (inverse characters for lower letters again) and sent to the printer. The machine code uses up about 1K of your 16K Ram and is run in from tape which auto-runs. The printer interface is via a 26-way IDC connector on the back.

Amber has produced a very small 21/2inch-wide plain paper printer. Since it does not use a standard centronics interface (a 25-way 'D' socket is used), Amber has produced its own interface. The board comes with a plug on it for the printer, cable and pcb interface to plug into the ZX81's expansion port. No program is provided on tape, though one is Listed in the instructions to convert ZX81 codes into Ascii (in Basic). The output to the printer is via a 16-byte machine code placed above Ramtop. You will have to write your own Llist, Lprint and Copy routines as the programs given only allow you to output single bytes. Ascii codes 0-127 are used eight-bit codes are only used after a control character to produce graphic dots on a line and there are only 24 characters per line.

The Euroelectronics *Lprint* interface consists of a low, flat, black, plastic box, which plugs into the expansion port at the back of the Spectrum. It has no extension pcb, so all other devices must be placed between it and the computer.

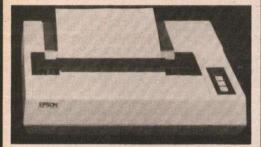
The box contains a Rom for all the routines (it sits in a spare Rom space), except Copy which is available on tape as an optional extra. Lprint will ignore graphics, both user definable and Sinclair, as well as underline. Lprinting chr\$(5) before any set of characters allows any code to be sent to the printer direct and many to be turned off with chr\$(4).

On Llist it does not recognise a 32column format, but goes on to print out until a new line is reached either on the

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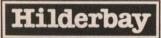
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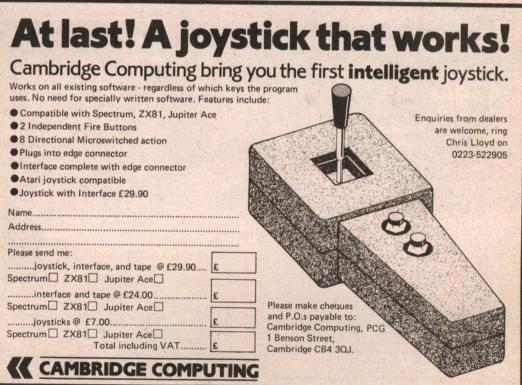
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Space explorer

Maurice Gavin explores the Solar System with the aid of his 16K Spectrum

Fancy a trip to real worlds, via your computer, without the empty fantasy of yet more space games? Now you can with this astronomy program for the 16K Spectrum. It enables you to "view" the Solar System as seen from the "skies" of any planet, including Earth, and for any date. You can even defy the mythical Icarus by "viewing" the planets from the surface of the Sun or perhaps from Jupiter during a space-craft's fly-by.

The program contains all the necessary data to compute the various planetary positions (ecliptic longitude), the constellation in which each planet appears and the angular separation from the Sun (solar elongation). This is displayed in both table and graphic form — the latter as a 360° panoramic strip of sky centred on the Sun. The computation and display take but a few seconds and are deliberately slowed down to make the information easier to assimilate. Good use is made of the Spectrum's colour and graphics and an option to *Copy* the screen via the ZX printer is included.

The initial display lists the planets and Draws the orbits to two scales — one for the Earth-like "rock planets" Mercury to Mars, and one for the remote and "giant gas planets" Jupiter to Neptune. Despite the program's simplicity, it is sufficiently accurate for you to identify the planets as seen from your back garden. This naturally assumes you choose Earth" as your view-

point and *Input* a current date with a clear evening. A star-atlas like Norton's will be useful in finding the constellations.

The exceptions to this are the remote planets Uranus, Neptune and Pluto which are all too faint to be seen without a telescope and even then are indiscernible from the stars. Pluto is excluded from the program, because its orbit is highly elliptical and inclined 17° to the general plane of the planets called the ecliptic. Circular orbits of zero inclination are therefore assumed — Mercury and Mars prove the least accurate but only so over long periods of time.

The results of a program of this type are called 'ephemerides' and it may be of interest to discuss the principles behind them.

A plan of the Solar System could be likened to a giant clock with eight hands of varying length — the outer tip of each hand representing a major planet. Each hand will sweep-out the same area (shown shaded in Fig 1 and 2) in the same time interval. Thus planets progressively further from the Sun move more slowly and take longer to complete an orbit.

Knowing the position of the planets on an epoch, or reference date, it is only necessary to wind the hands backwards or forwards to locate the planets on any other date — past, present or future. If your viewpoint is the Sun, each planet will appear projected onto the background

constellations; ie, Signs of the Zodiac equal to the planet's heliographic (Suncentred) longitude. If your viewpoint is a planet, then the computer performs the necessary triangulation to deduce the revised positions.

The Rem statements show the general structure of the program with the *Data* held from Line 1000. This program was originally designed for my ZX81 and I still have a liking for slicing string arrays for data! Be sure to double check these arrays are correctly entered — the smallest error will produce wrong results. Use the sample screen display to check your results.

In the graphic displays, a "*" symbolises the Sun and "h" for Hermes (the alternative classical Greek name for Mercury to avoid confusion with "m" for Mars). The 'ecliptic longitude' (ecl. long) gives the planet's angular distance from the First Point of Aries ie 0° measured eastwards from 0° to 360°, and the 'solar elongation' (elong) the angular distance from the Sun ie 0° — a minus (—) figure indicates the planet is to the right of the Sun.

Lines 420 and 440 separate the planets into two groups - those nearer to the Sun (inner planets) and those further from the Sun (outer planets) from the chosen viewpoint and computes their positions accordingly. Under test it will be noted that, as seen from Earth, the 'inner planets' Mercury and Venus never stray far from the Sun, whilst all the remaining and therefore 'outer planets' can be found anywhere along the ecliptic. Conversely, from Neptune all the planets become 'inner planets' with Mercury to Mars sometimes never more than a fraction of a degree from virtually undetectable to a the Sun Neptunian!

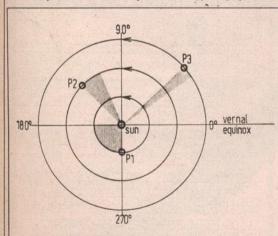


Figure 1
Kepler's 2nd Law of Planetary Motion — where each planet sweeps out an equal area in an equal time interval. In this simplified solar system with the planet's orbits equally spaced, P1 covers a complete quadrant whilst P2 covers ¼ quadrant (1/2²) and P3 covers 1/9 quadrant (1/3²).

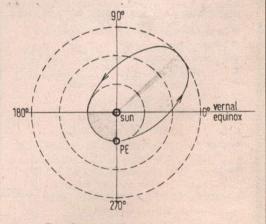
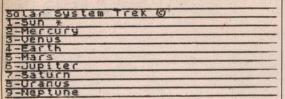
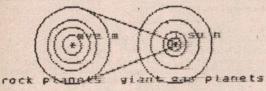
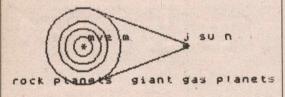


Figure 2
A planet PE in a highly elliptical orbit still follows the same "law", its velocity constantly changing according to its current distance from the Sun.

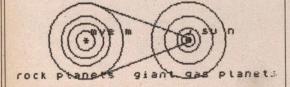




Solar System Trek (§) 1-Sun * 2-Mercury 3-Venus 4-Earth 5-Mars



Solar System Trek ©
1-5un *
2-Mercury
3-Venus
4-Earth
5-Mars
6-Jupiter
7-Saturn
8-Uranus



Planet	ect.long	const	elong
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3-Venus	152.5	reo	33.1
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5-Mars	105.7	后官班	-23.7
5-Jupiter	247.3	500	117.9
7-Saturn	204.5	Vir	75.2
8-Uranus	240.3	500	110.9
9-Neptune	267.5	500	130.2

zodiac constellations

Cp5a ScLi Vr Le CnGe TaAr PiAq C

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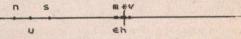
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CPSa ScLi Ur Le ChGe Tanr Ping C

Planet	ect.long	const	elong
L-5un *	97.5	G20	0
2-Mercury	101.9	Gem	4.3
3-Venus	89.7	7.44	-8
-Earth	108.5	Gem	10.9
5-Mars	112.6	Gen	15
3-Jupiter	(Viewpoin	1.11984	APE 21
7-Saturn	213.4	Lib	115.8
3-Uranus	244.1	5.00	146.5
-Neptune	270	5gr	172.4

zodiac constellations

a Schi Ur Le Coge Taff Ping Cpsa



a Schi Vr Le Code Tafr Pifq CpSa

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1-5un #	127.1	Cnc (
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8-Ucanus	35.7	Hri -	11.4
9-Neptune	161.1	Leo :	34

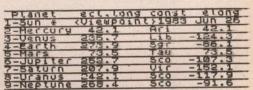
zodiac constellations

CpSa ScLi Ur Le CnGe TaAr PiAq C

NV *## S

11

CPSa Schi Ur Le ChGe TBAr PiAq C



zodiac constellations r Le ChGe TaRr PiRq CpSa ScLi Vr

at a continued over the page

10 REH Solar System T Maurice Gavin, BRIGHT 1: GO SUB 1000 REM Minitial screen display LET L=1: CLS: BORDER RND*S PRINT PAPER 5; "Solar System PRINT 60 PRINT AT 14.10; "mve m
50 n"; AT 15.9; "*"; AT 15.21; "*"
70 PRINT AT 19.6; PAPER 4; " ro
k planets "; PAPER 5; " giant ga
planets"
80 LET a=0: LET ax=23
90 FCR n=1 TQ 9: IF n=6 THEN P
105E 50: GO SUB 800: PAUSE 50: L
T a=96: LET ax=20/17
100 CIRCLE 75+a,51,a(n) *ax
110 PRINT AT n,0; PAPER 6-(2 AN
120 GO SUB 790
130 REM select viewpoint
140 INPUT "Enter planet no", k:
IF k(1 OR k)9 THEN GO TO 140
150 BORDER k/2: LET j=k
160 PRINT PAPER 1; AT 10,0; b\$
170 PRINT AT 11,0; PAPER 0; INK
7; "
Zodiac constellations AT 14.10, "mve m 15.9; "") AT 15.21; "*" AT 19.0; PAPER 4; " ro "; PAPER 5; " giant ga 50 CK *ATN (SIN ((g-qe)/r))/(a(n)-COS ((g-qe)/r)) 450 GO TO 470 460 LET et=q 470 IF et <=0 THEN LET et=et+e 480 IF et >e THEN LET et=et-e 490 IF et>e OR et<=0 THEN GO T 490 LET el=INT (.5+el+10)/10
REM Solar elongation
IF n=1 THEN LET sun=el 500

530 IF j=1 THEN LET SUN=0
540 LET b=INT ((et-sun)*10)/10
550 IF b >180 THEN LET b=b+e
550 IF b(-180 THEN LET b=b+e
570 IF e()=e (HEN LET el=e-e
580 LET v=1+INT (el/30)
590 PRINT AT n,0;9\$(n);
600 PRINT TAB 10;("" AND el(9);("" AND el(99);el;TAB 19;c\$(v*
4-3 TO v*4);
610 PRINT TAB 24;("" AND b>-10
0);("" AND b>=0 AND b(10);(""
8ND b>=10 RND b>=0 AND b(10);(""
8ND b>=10 RND b>=0 AND b(10);"
620 REM print zodiec/planets
630 LET w=S0-sun/12: IF w>=0 TH EN LET w=w+1
640 LET rs=ms(w TO) +ms(TO w)
650 PRINT INK 7; PAPER 2; AT 13,
0; rs; AT 20,0; rs
660 LET z=0: LET nn=n/2
670 IF nn=INT nn THEN LET z=3
680 PRINT INK 7; PAPER 1; AT 15+
z,b/12-16; zs(n)
690 REM plot planets position
700 CIRCLE INK 7; INT (132-b/1.
51,40,1: BEEP .1,n*3: NEXT n
710 REM pend of mainloop
720 IF j=1 THEN PLOT 130,38: DR
AU INK 6; 4,4: GD TO 740
730 PLOT 132,32: DRAW INK 6; 0,1 LET w = w + 1730 PLOT 132,32: DRAW INK 6;0,1
5
740 GO SUB 790
750 PRINT #0;"Press z to copy,
c to continue": PAUSE 0
760 IF INKEY\$="z" THEN COPY
770 GO TO 40: REM FERUN
780 REM SOSUB "Lines"
790 FOR n=175 TO 90 STEP -0: PL
OT 0,n: DRAW 255,0: NEXT n: RETU
RN
800 CIRCLE 171,51,2: PLOT 171,5 RN 800 CIRCLE 171,51,2: PLOT 171,5
3: DRAW -90,33: PLOT 171,49: DRAW -90,-33: RETURN
1000 REM data & variables
1010 DIM a(9): DIM t(9): DIM t(9)
1020 LET U=365.2654
1030 LET ep=1975: LET e=360
1040 LET r=180/Pl: LET r=e/Pl
1050 LET c=e/U 1030 LET ep=1975: LET e=360
1040 LET r=180/P1: LET rr=e/P1
1050 LET r=e/U
1060 LET r=e/U
1060 LET f=83. LET g=1e4
1070 LET os="JanfebMarAprMayJUNJ
U1AU95epOctNovDec"
1080 LET ms="*Le CnGe TaAr PiAq
CP5a ScLi Vr": REM #Zodiac signs
1100 LET ts=""*D00003206633109750
99534249629355214104173205783249
915": REM #Zong at epoch(1975201
1100 LET ts="00000124085.612164
.79": REM #Period in years
1120 LET as="0000010038710072380
1000001.880911.86229.45884.012164
.79": REM #Period in years
1120 LET as="0000010038710072380
10000015237052026095368191818300
579": REM #Period in years
1130 LET ps="1-bun * 2-Mercury
1130 LET ps="1-bun * 2-Mercury
1140 LET cs="Psc Ari Tau Gem Cnc
Leo Uir Lis" Psc Syr Cap Aqr "
1150 FOR a=1 TG 9: LET x=n*6
1160 LET a(n)=UAL as(x-5 TO x)/F
1180 LET t(n)=UAL ts(x-5 TO x)/F
1180 LET ts(n)=UAL ts(x-5 TO x)/F

Listed searching

Bryan Skinner looks at some of the advantages of the binary chop search routine

In a previous article (PCW 23-29 June), I described how a string array could be searched for the occurrence of a user defined sub-string. The search routine described was sequential.

Each specified field or column of each row was tested in turn; ie, the array was searched row by row. If there are a large number of rows this can turn out to be a very slow procedure, particularly if you are searching a random-access file on disc (which can be thought of as a large array).

There is, of course, a more efficient and therefore faster search algorithm that can be used. The method is known by various names, my favourite being the "binary chop". The method is without doubt the fastest way of searching a list, but it does have a number of prerequisites which can be limiting:

- (a) The list must be in order; either alphabetical, numeric or ASCII (depending on the comparison made).
- (b) There must be no blank entries, ie, the list must be "dense".
- (c) The size of the list must be known.
- (d) Each entry must be unique, as the search will only find one item.
- (e) Only direct matching is allowed, you cannot use

The algorithm is so efficient that doubling the length of the list only adds a few extra comparisons to its operation.

The procedure employed is similar to that used by human beings searching for a word in a dictionary. If you were looking for the word Search, you might open the book at its mid-point and see the word Middle. Search comes after this in alphabetical order, so you can ignore the first half of the dictionary.

Next, you would halve the remaining pages, ie, open the book mid-way between the mid-point and the end. You might alight upon the word *Test*, which is alphabetically greater than the target word *Search*, so you would halve the distance between *Middle* and *Test*, perhaps finding *Perch*. As this word is too "low" in alphabetical order, you would halve the difference between it and the previous word *Test*, and so on.

The basic operations then are:

- (a) Setting two points
- (b) Finding the mid-point between them
- (c) Testing the item at the mid-point.
- (d) Deciding the direction in which to proceed (if a match is not found)

Figure 1 shows the search routine in diagramatic form, where we are looking for the letter *F* in the letters *A-T*.

Obviously, we must also add checks to ensure that we do not "run off" either end of the list and to allow us to exit from the routine if the word is not found.

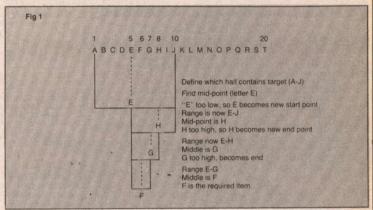
The coding is relatively simple; the example given sets up a list of names in a

string array and allows you to search for a name. You should be able to modify the actual search routine to your own needs for multi-dimensional arrays of characters or numbers, but do not forget to alter the relevant variables!

Cr and Pr are the list pointers to the Current and Previous Records. I is the

mid-point between *Pr* and *Cr*. Line 1090 decides the direction to search in, according to a comparison between the item being searched for and the current item being tested.

Ef is used as an Error Flag to prevent oscillations between adjacent entries. Ef is incremented each time the difference between the Current item and the Previous item equals 1 (line 1040). Line 1030 tests for running off the ends of the list.



```
10 REM SET UP ARRAY
20 NR = 10
30 DIM ARS(NR)
40 FOR I = 1 TO NR
50 READ ART(I)
60 NEXT
70 DATA BILL, CHARLES, ETHEL, FREDA, GERTRUDE
80 DATA HILARY, JOHN, KEVIN, LIONEL, MARY
90 CLS:REM XXXXXXXXXX ENTRY POINT FOR SEARCHES
100 PRINT "ENTER NAME TO FIND ";
110 INPUT AS
120 IF AS = "ZZZ" THEN END
130 GOSUB 1000
140 GOTO 90
150 REM XXXXXXXX END OF "MAIN PROGRAM"
1900 REM SEARCH - BINARY CHOP
1010 \text{ CR} = INT((NR/2)+.5)
1020 PR = 1 : EF= 0
1030 IF CR < 0 OR CR > NR THEN GOTO 2010
     IF
        ABS (PR-CR) = 1 THEN EF= EF+1:PR=PR-1
1040
1050 IF EF > 2 THEN GOTO 2010
1060 IF A$ = AR$(CR) THEN PRINT "FOUND" : RETURN
1070 I = ABS(FR-CR)
1080 I = INT((1/2)+.5)
1090 IF A$ > AR$(CR) THEN CR = CR+I ELSE CR = CR-I
2000 GOTO 1030
2010 PRINT "NOT FOUND"
2020 RETURN
```

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Assembled-part three

Jeremy Ruston continues his introduction to assembly language programming

The And instruction logically Ands the contents of a memory location with the contents of the accumulator. The And operation is identical to the And operation carried out by the Basic keyword And. However, the assembly language version of And only acts on eight bits at a time.

It can easily be extended to act upon data of arbitrary length, by simply using more than one And instruction, each acting upon a different pair of bytes. The addressing modes allowed with the And instruction are the same as those used with the Adc instruction. The And instruction sets the flags as follows:

Zero flag — set if the result of the calculation was zero Sign flag — set if the result was negative (it reflects the status of bit 7 of the result)

The AsI instruction works with rather fewer addressing modes than the Ada and And instructions. The addressing modes allowed are:

Accumulator, eq. ASL A Zero page direct, eg. ASL &20 Absolute direct, eg. ASL &3000 Zero paged indexed with X, eg. ASL &20,X Absolute indexed with X, eg. ASL &3000,X

You'll notice that besides the accumulator mode, these modes can be reduced to two distinct modes — indexed with X and absolute — since the assembler automatically works out whether zero page should be used or not.

The As/ instruction mnemonic stands for 'arithmetic shift left', which means that the instruction moves all the bits in the number one position to the left. This moves the contents of bit 0 to bit 1, bit 1 to 2 and so on. But, there are some slight problems. Bit zero is going to be undefined and bit 7 has nowhere to go, because bit 8 doesn't exist. In fact, bit zero is always left unset, and the contents of bit 7 are copied into the carry flag, in the same way as the carry flag acts as bit 8 in the Adc instruction.

The other status bits affected are:

Zero flag — set if the result was zero
Sign flag — set if the sign of the result was negative

The Bcc instruction is called a conditional jump instruction or, sometimes, a conditional branch instruction. It acts somewhat like the 'If <condition> Then Goto line v number>' statement of Basic. The Bcc instruction will only carry out the Goto to a new address if the carry

flag is clear.

The way it carries out the branch is not totally expected. Rather than loading the program counter with a new value, it adds a displacement to the present value of the program counter.

There are two problems with this approach. The program counter is set to the address after the *Bcc* instruction, before the displacement is added to it, and the displacement can only be an eight bit

number. This means that the range of the branch is only within +/- 125 bytes of the Bcc instruction. Luckily, you don't have to explicitly work out whether a branch instruction such as Bcc will reach a specific address, since it will not assembly an instruction which branches out of range.

To use the *Bcc* instruction in your programs, you must follow it with a label. This sample program explains what a label does:

does: .START LDA &80 CMP &81 BCC START RTS

A label is like a place marker in the program. It is created by writing the name of the label preceded by a full stop (a label can be followed by other instructions without using a colon to start a new statement). When a label is processed by the assembler, it assigns the address of the instruction that follows the label to the variable name given as the label. Thus, labels must adhere to the normal BBC Basic rules for naming variables and the label becomes a mnemonic for the address it is placed at.

When a branch or jump instruction is struction is taken as the destination for the jump. It may not seem very useful to be able to execute a jump if the carry flag is set, but it allows us to do several vital things, like see which of two numbers is the larger. After we have looked at all the instructions, you will find a table of how and why each of the branch instructions should be used.

The Bcs and Beq instructions do more or less the same thing as the Bcc instruction, except that different conditions spark off the jump. The Bcs will only branch if the carry flag is set, whilst the Beq instruction will only jump if the zero flag is set — in other words, if the last result was zero.

The Bit instruction logically Ands the contents of the accumulator with the contents of a selected memory location and then sets the condition flags accordingly. Weirdly, it doesn't alter the contents of the accumulator or the contents of the memory byte. Thus, the only effect this instruction has is on the condition flags. The only addressing modes allowed are:

Absolute, eg. BIT &1234 Zero page, eg. BIT &23

In other words, you can only carry out the *Bit* in struction on the contents of a memory location the address of which is known at the time you write the program.

The point of this instruction is to allow you to see if a certain bit (or bits) of a memory location are set (or unset), without upsetting the contents of the location, and

ignoring any untested bits. This is a useful operation since it allows you to set up, in effect, your own flags register in memory.

To use the instruction, first select the bits you wish to test of the location. For example, if you wished to see how bit 4 of location &234 was set, the bit in question would be bit 4. Then, turn the 'value' of the bit into a number. The value of bit 4 is 2^4, or 16. You can then write instructions to load this number into the accumulator, and do a Bit instruction with reference to location &234. If the selected bit was zero, the zero flag will be set, otherwise, it will be unset. The code needed in this example would be:

LDA £16 BIT &234

The other use of this instruction is to inspect the contents of bits 6 and 7 of a memory location, without disturbing the accumulator. For example, after this instruction, the sign and overflow flags are set to the state of bits 7 and 6 respectively of location &234. Once these bits have been moved into the flags, you can use them in calculations. The other result is that they allow you to use the top two bits of any location as flags, and then test them, without having them do anything to the accumulator — without even having to load a 'mask', as we did above.

To sum up the action of the flags:

Zero flag — set if the result of the AND operation was zero

Sign flag — set to the status of bit 7 of the memory byte selected

Overflow flag — set to the status of bit 6 of the memory byte selected

The *Bmi*, *Bpl* and *Bne* branch instructions all act like the *Bcc* instruction, except they branch under different conditions. The *Bmi* instruction (Branch if Mlnus) will only branch if the sign bit is set; the *Bpl* instruction (Branch if PLus) will only branch if the sign bit is unset, and the *Bne* instruction will only branch if the zero flag is not set.

The *Brk* instruction is described in the User Guide in its capacity for trapping errors in programs, such as the 'No such line' message in Basic. The internal action of the *Brk* instruction is to set the break flag, push the program counter and status register on to the stack and finally to jump to the routine whose address is contained in locations *&FFFE* (*Isb*) and *&FFFF* (*Isb*)

It is worth pointing out that interrupts also jump to the same address. The only way the operating system can see which type of interrupt (*Brk* or external) caused the jump to the routine is to look at the contents of the flag register. Finally, the action of jumping to the routine automatically disables interrupts.

To be continued next week

This is an extract from *The BBC Micro Compendium*, available from 1 August, from Interface Publications, 44-46 Earls Court Road, London W8 6EJ.

Martech Durell



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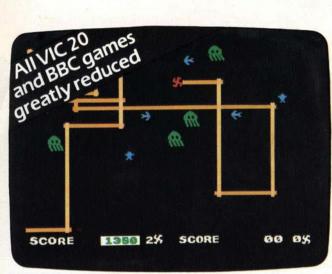
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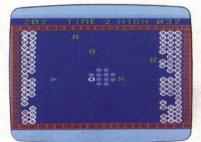
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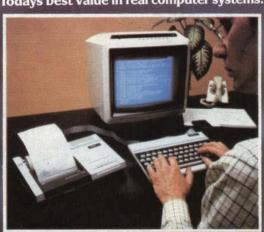
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A built-in program

Every computer program, regardless of the language in which it is written, begins its life as a series of instructions stored in a coded form within the computer's memory. In the case of most languages, the instructions which make up the program are quite meaningless to the central processing unit or CPU, the computer-within-a-computer which will eventually be called on to execute the tasks dictated by the program. To overcome this problem, standing in between the program entered by the user and the CPU will be yet another program, most often built into the machine at the time of its manufacture. which takes the user's program and translates it into a form which the CPU is able to understand.

The permanent, "built-in" program, however, performs another function, for without its help it would be impossible for the user to enter instructions in the first place. From the moment the computer is

switched on, the built-in program begins its task of scanning the keyboard to detect an input from the outside world. It then takes those inputs and stores them in the memory in such a way that they can later be interpreted for the CPU.

The user who writes programs in Basic will seldom be aware of this process. Program lines will be entered, the return key pressed and the line will become part of the program — provided that the correct grammar of Basic has been observed. No real effort or thought is required to insert a new instruction into the program, for the computer's memory is automatically rearranged to make space for the new input.

When we turn to programming in machine code, the situation is not quite as simple. There are no facilities built into the computer to allow a new instruction to be simply entered from the keyboard in the confidence that it will automatically be entered into the computer's memory and

the present contents rearranged to make room for it. The first task of a machine code programmer is, therefore, to devise a method of entering instructions, examining memory and rearranging it to suit the developing needs of the program that is being entered. This is true whether the machine code instructions are being entered directly in the form of numbers (which is the eventual form in which they must be presented to the CPU), or by means of a special language called assembly language, which makes machine code programs easier to enter and understand.

The simplest tool which allows the necessary management of the memory to take place is called a monitor. In this series we shall build-up a flexible monitor program which will allow you to examine individual bytes of memory or chunks and to modify their contents at will.

This is an extract from Commodore 64 Machine Code Master by David Lawrence and Mark England, published by Sunshine Books.

MASTERCODE: TABLE OF VARIABLES Current address in memory (Assemble to memory) flag used in assembler Current number base for conversions MA BASE CD Continue in monitor/Command in file editor Indicates device for load/save Used in file editor to record empty lines' (End Address) used in monitor (Error Bount) during assembly ES EA (Error Number) used to indicate type of error during assembly (Error Only listing) flag used in assembler en Used to flag error conditions Error messages for assembler Set if END directive encountered by assembler EXIT Logical value (=0) FALSE Main file array in file editor FIF Line to finish list or delete in file editor Number of lines in FI\$ Converts decimal digit to hex ASCII EM ENDER Converts hex digit to decimal FNHEX (Finish Pointer) used by list and delete in file editor Used in conversion routines - H# converted to decimal General string for input and output of hex numbers General variable used for input H\$ INE (Line Number) used in file editor Pointer used in scanning assembly language instruction Holds order of items in FI# PTRA Operand type: assembler and disassembler General output string Output string used in dump of memory contents to screen Output string used in dump of memory contents to screen and 01\$ D2# disassen Output string used in dump of memory contents to screen Current pass of two pass assembler Pointer to mnemonic type Loop variable used in assembler Start address of line being assembled Loop variable used in assembler 01 Temporary variable used in formatting assembler output D1# Output of expression evaluator (Start Address) used by severalroutines Current number of symbols during assembly RESULT SE (Start Line) used in list and delete in file editor Maximum number of symbols in the symbol table SL Start pointer for list and delete in file editor System veriable in Basic ST (Symbol Table) used in assembler STA Used to indicate dump of symboltable in assembler T,TA.TB.T0,T1.T2 etc Temporary variable used in several modules TE Temporary variable used in several modules Decoder tables for assembler/disassembler TAS T1\$ Temporary variable used in several modules Temporary result in expression evaluator Logical value (=-1) TRUE Loop variable used in Hex Loader Loop variable used in file editor Loop variable used in file editor X1

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the Program of the Week double our new fee of £6 for each program published.

Bounce

on Spectrum

The object of this program is to bounce the

babies that fall from the building across the screen, and to also catch the parachutists who fall from the helicopter. You get 50 points for bouncing a baby, 100 points if you bounce it off the screen, and 100

points for catching a parachutist. Difficulty 'j' alters the babies x coordinate as it falls back to earth for the second or third time.

Lines 2 to 160 set up the user defined graphics and lines 9000 to 9080 set up the variables. The reason I used *Print at in lines* 6000 to 6009 was because I found that a *For next* loop produced a flickery effect and it also slowed the game down considerably.

d

```
WELCOME TO BOUNCE
@ 1983 S.McIntosh
 105 FOR t=0 TO 7
107 READ X 57 + t, X
115 NEXT t
130 DATA BIN 00001110, BIN 1000
1100 DATA BIN 00001110, BIN 1000
1101, BIN 01100100, BIN 00011100, BIN
10011, BIN 00010001
1011, BIN 00010001
1015 FOR t=0 TO 7
140 READ X
150 POKE USP
    135 FOR t=0 TO 7
140 READ X
150 POKE USR "["+t,X
160 NEXT t
164 PRINT AT 4,0;" WELCOME
TO BOUNCE
185 PRINT AT 6,0;" © 1983
;MCINIOSH
166 INPUT "ENTER DIFFICULTY 'J'
(1 OR 0).";
167 CLS
169 FOR t=6 TO 19
170 PRINT AT t,27;"""
180 PRINT AT 19,27;"""
200 PRINT AT 5,27;"""
200 PRINT AT 19,0;""
                                       AT 19,27; THE ST. 19,0; THE
                    PRINT
   201 GO SUB 6000
202 IF L=0 THEN
205 IF a=0 THEN
1: LET sc=sc+100:
49)+6: LET a=27:
207 IF d=17 AND
                                                           GO TO 400
PRINT AT d,a;"
LET d=INT (RN
GO TO 200
a=m+1 THEN LET
                                                                                                'a;"
```

```
d=-d
210 PRINT AT 18, m; "* 1"
215 If d=18 THEN PRINT AT d,a;
INVERSE 1; FLASH 1; "SPLAT"; FLASH
H 0; INVERSE 0: FOR q=0 TO 24: B
EEP 1; Q: NEXT q: PRINT AT d,a;
D*9) +6: LET 1=27: GO TO 200
226 IF INKEY$="P" AND m <24 THEN
LET m=m+1: PRINT AT 18, m+3; ""
230 IF INKEY$="O" AND m>0 THEN
LET m=m+5: PRINT AT 18, m+3; ""
240 IF INKEY$="P" AND m <22 THEN
LET m=m+5: PRINT AT 18, m+3; ""
                  245 IF INKEY$="P" AND m>=22 THE

1 LET m=24: PRINT AT 20,18;"
250 IF INKEY$="O" AND m>4 THEN
250 IF INKEY$="O" AND m>4 THEN

LET m=m-5: PRINT AT 18,m+5;"
270 IF -d=10 THEN LET d=-d: LET
a=a-j: PRINT AT d,a+j;"
300 LET a=a-1: LET d=d+1;
300 PRINT AT d-1,a+1;"
310 PRINT AT d-1,a+1;"
BEEP .06,
INT (RND*24)
320 PRINT AT d,a;"*"
3250 LET w=s+1
3300 LET w
350 LET w = 1 0, w = 1; "
340 LET w = 1 0, w = 1; "
340 IF w > 50 THEN PRINT AT 0, 29
350 IF sc > 1000 THEN PRINT AT b,
360 IF sc > 1000 THEN PRINT AT b,
360 IF sc > 1000 THEN PRINT AT b,
370 IF b = 16 AND c = m + 1 THEN PRINT
T AT b + 1; c; " "
T AT b + 1; c; " "
T AT b + 2; " "
T AT b + 2; " "
T AT b + 3; " "
T AT b + 4; c; " "
T AT b + 5; " "
T AT b + 6; " "
T AT b + 7; " "
T AT b + 8; " "
T AT b + 100; LET b = 0; LET c = INT (RN
1000 IF b = 10 THEN PRINT ST
1000 IF b = 10
                         390 GO TO 201
400 PRINT AT 5,10; FLASH 1; INU
ERSE 1; "GAME OUER"; FLASH 0; INU
ERSE 0:
450 PRINT AT 10,8; "YOU SCORED"
450 PRINT AT 12,11; BRIGHT 1; F
500 PRINT AT 12,11; BRIGHT 1; F
10 IF INKEY$="Y" OR INKEY$="Y"
THEN RUN
520 GO TO 510
6000 PRINT AT 6,27; """
60002 PRINT AT 7,27; """
60002 PRINT AT 8,27; """
60004 PRINT AT 9,227; """
60005 PRINT AT 10,27; """
60007 PRINT AT 11,27; """
60007 PRINT AT 12,27; """
60009 PRINT AT 13,27; """
60009 PRINT AT 16,27; """
60009 PRINT AT 16,27; """
60009 PRINT AT 18,27; """"
60009 PRINT AT 18,27; """""
60009 PRINT AT 18,27; """"
60009 PRINT AT 18,27; """""""
60009 PRINT AT 18,27; """""
60009 PRINT AT 18,27; """""
60009 PRINT AT 18,29; """""
                                                                                                                                                                                                                                                                                b=0:
                                                                                                                                                                                                                                                                                                                                                                                                                         LET C=INT (RND+16)
                                    9010
9020
                                                                                                                                                                         LET
                                                                                                                                                                                                                                                                                W=1
1=5
                                            9030
                                    9040
9050
9050
9060
9070
9080
9100
                                                                                                                                                                  LET W=15.
LET d=1NT
LET a=27
PAPER 6:
BORDER 6:
RETURN
                                                                                                                                                                                                                                                                                                                                                                                                                                           (RND +9) +6
                                                                                                                                                                                                                                                                                                                                                                                                                  INK Ø
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         Bounce
                                                                                                                                                                                                                                                                                                                                                                                                                                                   CLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         by S McIntosh
```

Decimal Hex

on ZX81

This program converts decimal codes to Hex and vice-versa. Although there are much simpler ways of achieving this I have deliberately made it very user friendly so that it is clear how it all works.

Parts of this program can be isolated 310 330 520 the maximum no of entries you wish to and used separately as toolkit routines.

Program notes

240 360

These lines check if N/L has accidentally been pressed (the commonest error when entering machine

Set the limits of Q and Z and Dim D to

make at the same time

1210 2120 2140 2610

530 620 1200 These lines peek to see if the screen is about to overflow. A simple check which avoids the need to use Cont. when the screen fills up.

I have used Run in several places to restart the program - this is because the variables need to be reset before running.

```
REM DONALD MACLEOD, MAR/83
FAST
CLS
        10 CLS
20 PRINT TAB 4; "DES TO HEX AND
30 PRINT
40 PRINT
50 PRINT
70 PRINT

           10
GE
90 PRINT TAB 8; "SEVERAL ENTRIE

PER RUN"

100 PRINT " ... DEC TO HEX

ONE 1 BYTE"
112 PRINT TAB 8; "ENTRY PER RUN"
120 PRINT ," ... AS OPTION
THREE BUT WITH" 8; "SEVERAL ENTRIE
5 PER RUN"
140 PRINT OT 21 4: "ELESE ENTRIE
       140
                           PRINT AT 21,4; "ELECTE SAMES
                     SLOW
SLOW
IF INKEY$="" THEN GOTO 140
LET I=VAL INKEY$
GOTO 100+I*100
     150
160
170
180
     PRINT "DETICN DNE"
PRINT AF 18,6; "ENTER 1 SYTE
NOW"
                                        PUT AS
CODE AS=0 THEN GOTO 230
                          IF CODE A$=0 THEN GOTO 230
FAST
CLS
LET H=16*CODE (A$)+CODE (A$
476
  260
270
(2))
                           GOTO 2000
CLS
     286
                           DIM D$(8,2)
PRINT "BALL
FOR Q=1 TO 8
     310
                          PRINT
FOR Q
      330
                                                        AT 18,6; "ENTER 1 BYTE
     340
HEX
350
                          PRINT
                           INPUT D$(Q)
IF CODE D$(Q) =0 THEN GOTO 3
      360
50
                           PRINT AT 18,6;"-----
     365
     378
                           NEXT 0
                            FAST
                          CL5
PRINT "BETTO, TREE"
PRINT AT 18,6; "ENTER 1 BYTE
NOW"
                           GOSUB 1200
GOTO 2100
      380
     390
     410
                            INPUT X
                          INPUT X
FRST
CLS
GOSUB 1000
GOTO 2200
CLS
PRINT "BTION FOUR"
DIM D$(8.4)
FOR 9=1 TO 5
PRINT AT 18,6; "ENTER 1 BYTE
NOU"
INPUT D$(9)
IF CODE D$(9)=0 THEN GOTO 5
     430
     450
450
470
500
      510
      530
      DEC
550
       560
       570 PRINT AT 18,6; "----
                            NEXT Q
      580
       500
                            PRINT TAB 6, "8 13; "8
  610
```

```
620 FOR Z=1 TO 8
630 LET F=0
640 FOR K=1 TO 4
650 IF F=1 THEN GOTO 700
660 IF D$(Z,K)=" "THEN LET X=V
RL D$(Z,TO K-1)
670 IF D$(Z,K)=" "THEN GOSUB 1
                                                                 IF D$(Z,K)=" "THEN GOS

IF F=1 THEN GOSUB 2600

NEXT K
NEXT Z
GOSUB 2500

RUN

LET Y=X/16
LET X1=INT Y
LET X2=Y-INT Y
LET P1=X1
LET P2=X2*16
LET N=28
LET T=0
LET R$=CHR$ (N+T) GND F
IF P2=T THEN GOTO 1110

LET T=T+1
GOTO 1070
LET N=28
LET T=0
LET P$=CHR$ (N+T) AND F
IF P1=T THEN GOTO 1170
LET P$=CHR$ (N+T) AND F
IF P1=T THEN GOTO 1170
LET T=T+1
GOTO 1130
LET H$=P$+R$
LET F=1
RETURN
DIM H$(8,3)
FOR 8=1 TO 8
   000
680
690
700
710
720
         1000
1010
1020
1010 LET X1=INT Y
1020 LET X2=Y-INT Y
1030 LET Y2=X2+16
1050 LET P2=X2+16
1050 LET P2=X2+16
1050 LET T=0
1070 LET R*=CHR$ (N+T) RND P2=T
1080 IF P2=T THEN GOTO 1110
1090 LET T=T+1
1100 GOTO 1070
1110 LET N=28
1120 LET T=0
1130 LET P$=CHR$ (N+T) AND P1=T
1140 IF P1=T THEN GOTO 1170
1150 LET T=T+1
1150 LET T=T+1
1150 LET T=T+1
1150 LET F=T
1150 LET F=T+1
1150 LET H$=P$+R$
1150 LET F=T+1
1150 LET H$=P$+R$
1150 LET H$=P$+R$
1150 LET H$=P$+R$
1180 LET F=1
1190 RETURN
1200 DIM H$(8,3)
1210 FOR S=1 TO 8
1220 LET H$(0)=5TR$ (16*CODE (D$
(S))+CODE (D$(G,2))-476)
1230 NEXT 0
1240 RETURN
2000 PRINT TAB 6; "M=1"; TAB 13; "$
2010 GOSUB 2500
2020 RUN
2100 CLS
                                                                       RUN
     2100
                                                                       PRINT TAB 6; "BE"; TAB 13; "B
   211" 000
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                                                               FOR Q=1 TO 8
PRINT ,, TAB 6; H$(Q); TAB 13;
                                                                         IF PEEK 16442=3 THEN GOSUB
                                                                       NEXT 0
GOSUB 2500
RUN
PRINT TAB 6;"MMM";TAB 13;"M
TAB 6;X;TAB 13;H$
GOSUB 2500
                                                                       RUN
PRINT AT 21,4;" AGEIN
          2500
     2510
2510
2520
2530
2540
                                                          ) SLOU

) IF INKEY$="" THEN GOTO 2500

) IF INKEY$="N" THEN STOP

) IF INKEY$()"Y" AND INKEY$()

THEN GOTO 2500

) FAST

) RETURN
         2550
                                                                         PRINT , TAB 6; X; TAB 13; H$
IF PEEK 16442=3 THEN GOSUB
     2600
2610
2700
     2700
2700
2700
2710
2720
2730
2740
                                                                         RETURN
PRINT AT 21,4;" The same of the sam
                                                                         SLOW
                                                                         IF INKEY$="" THEN GOTO 2700
     2750
                                                                         PRINT TAB 6; "@ TAB 13; "@
                                                                   RETURN
                                                                                                                                                                                                                                                                                                                      Decimal Hex
```

by Donald Macleod

LY

Letter Head

on Dragon 32

This simple program will print either letter headings or envelopes. Lower case letters are obtained using Shift/0.

Although written for a Microline 80 the program can be adapted for most other printers.

```
10 'DRAGON PRINT
20 ' Copyright S. J. Halstead. 1983
30 PRINTOO, "****** ADDRESS PRINTER ********
30 PRINT@0, *********** ADDRESS PRINTE!
40 INPUT"INPUT NAME";f*
50 INPUT"INPUT 1ST LINE OF ADDRESS
60 INPUT"INPUT 2ND LINE OF ADDRESS
70 INPUT"INPUT 3RD LINE OF ADDRESS
80 INPUT"INPUT 4TH LINE OF ADDRESS
90 INPUT"INPUT TELEPHONE NUMBER
                                                                           ":A1$
                                                                           ";A2$
                                                                           ";A3$
                                                                           ":045
       INPUT "INPUT DATE" ; D$
100
       Z$="
110
       PRINT@480, "INPUT LETTER OR ENVOLOPE (E/L).
J$=INKEY$:IF J$="" THEN 130
       IF J$="L" THEN 160
IF J$="E" THEN GOSUB 260
150
       PRINT#-2, TAB(52), F$
170
       PRINT#-2, TAB(52), A1$
       PRINT#-2, TAB(52), A2$
190
       PRINT#-2, TAB(52), A3$
200 PRINT#-2, TAB(52), A4$
210 PRINT#-2, TAB(52), T$
220 PRINT#-2, TAB(52), Z$
230 PRINT#-2, TAB(52), D$
240 GOTO 120
250 REM ENVOLOPE SUB ROUTINE.
250 PRINT#-2, TAB(18), F$
270 PRINT#-2, TAB(18), A1$
       PRINT#-2, TAB(18), A2$
PRINT#-2, TAB(18), A3$
PRINT#-2, TAB(18), A4$
280
290
                                                                                                                  Letter Head
                                                                                                                  By S Halstead
310 GOT0120
```

Designer

on Oric

This program was written on a 48K Oric-1, but should work without modification on the 16K model. It is a useful aid to designing your own characters. Normal character generators will not work on the Oric, due to the unusual size of the characters. The display has a horizontal resolution of only 240 pixels (dots), but has a character width of 40 columns. The price for these extra characters per line is a character of only six pixels wide, instead of the usual eight.

When the Oric is switched on, or the reset button is pressed, the character set is copied into *Ram*. Thus virtually any character can be redefined in the following way:

1. FOR A = 0 TO 7

3. POKE 46080 + A + (8 × n), D

NEXTA

5. DATA 1st row, 2nd row . . . 8th row

Where n is the ASCII code of the character. The *Data* statement contains eight numbers, each the decimal equivalent of a row of the new character. These numbers normally have to be worked out using graph paper, and a knowledge of binary.

When the program is run, you will be asked to enter the character to be changed. It can either be entered as the symbol or the code. Codes 160-255 are free, and can be redefined at will. But if you wish to be able to print the character at will, then a character from the keyboard should be used, as in the program. After the screen has cleared, a grid is printed, containing a flashing cursor. This can be

moved at will using the arrow keys.

To fill a square, press the space bar. 'Del' will empty it. If you make a complete mess of your character, or change your mind, 'C' will clear it. When you are satisfied with your design, press 'Return' to store it in memory. If the 'R' key is pressed, the decimal number for each row will be displayed (this data is for the character stored in memory, and will not change until the new character is stored).

You can leave the program at any time by pressing 'E'. Pressing 'N' will cause the program to clear the screen and ask for the next character to be changed. These commands are summarised below the grid for convenience.

The program does not allow you to save the character set, as it is cleared as soon as Reset is pressed. The numbers should be copied down after pressing 'R'.

```
1 FOR A=0 TO 7
 2 READ D:POKE 46080+(8*ASC("E")+A),D
 3 NEXT A
   DATA 63,33,33,33,33,33,63
   FOR A=0 TO 7
 6 POKE 46080+(8*ASC("\")+A),255
   NEXT A
 8 DIM CH(6,8):DIM TCH(8)
   X=1:TX=1:Y=1:TY=1
10 PAPER 0: INK 6: PRINT CHR$(20)CHR$(17)
15 CLS
20 PRINT"Character (symbol or code) ";: INPUT C$
21 IF VAL(C$)>0 AND VAL(C$)<32 THEN GOTO 20
22 IF VAL(C$)=0 THEN CHR=ASC(C$)
  IF VAL(C$)<>0 THEN CHR=VAL(C$)
23
24 FOR A=1 TO 6:FOR B=1 TO 8
26
   CH(A,B)=0
28 NEXT B: NEXT A
30 CLS
35 PLOT 10,0, "Character: ": PLOT 20,0,2: PLOT 21,0, CHR$(CHR): PLOT 25,0,6
```

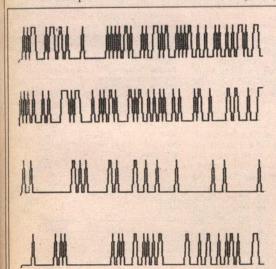
```
37 PLOT 26,0, "Code: ": PLOT 31,0, STR#(CHR): PRINT
 40 FOR A=1 TO 8:PRINT"ECCCC" : NEXT A:PRINT:PRINT
 45 PRINTCHR#(130); "RETURN"; CHR#(134); " to store character"
  46 PRINTCHR#(130); "DEL"; CHR#(134); " to empty square"
  47 PRINTCHR$(130); "SPACE BAR"; CHR$(134); " to fill square"
 48 PRINTCHR#(130); "R"; CHR#(134);" to review character data"
49 PRINTCHR#(130); "E"; CHR#(134);" to stop Program"
  50 PRINTCHR$(130); "N"; CHR$(134); " for next character"
  51 PRINTCHR$(130); "C"; CHR$(134); " to clear 9rid"
  52 PRINTCHR#(130); "ARROW KEYS"; CHR#(134); " to move flashing cursor"
  55 FL=1-FL:PLOT TX, TY, CH(TX, TY)+91:TX=X:TY=Y
  60 PLOT X, Y, 91+FL
 70 K$=KEY$
 80 IF K$=CHR$(9) AND X(6 THEN X=X+1
 90 IF K$=CHR$(8) AND X>1 THEN X=X-1
100 IF K#=CHR$(11) AND Y>1 THEN Y=Y-1
110 IF K#=CHR$(10) AND Y<8 THEN Y=Y+1
 120 IF K#=CHR#(13) THEN PLOT TX, TY, (CH(TX, TY)+91):GOTO 200
130 IF K#=CHR#(127) THEN CH(TX,TY)=0
140 IF K#=CHR#(32) THEN CH(TX,TY)=1
150 IF K#=CHR#(101) THEN PRINT CHR#(20)CHR#(17):END
160 IF K#=CHR#(114) THEN GOSUB 2000
 170 IF K#=CHR#(110) THEN CLS:GOTO 20
180 IF K#=CHR#(99) THEN GOTO 24
 190 GOTO 55
200 FOR A=1 TO 8:TCH(A)=0:NEXT A
 205 FOR A=1 TO 8
 210 FOR B=1 TO 6
 220 IF CH(B, A)=1 THEN TCH(A)=TCH(A)*(2^(6-B))
 230 NEXT B
 240 NEXT A
 250 FOR A=0 TO 7
 260 POKE 46080+(8*CHR)+A, TCH(A+1)
270 NEXT A
280 GOTO 55
2000 FOR A=0 TO 7
2010 PLOT 10, A+1,"
2020 P=PEEK( 46080+( 8*CHR )+A )
2030 PLOT 10, 8+1, STR$(P)
                                                                                  Designer
2040 NEXT A
                                                                                  by Andrew Roberts
2050 RETURN
```

Sound Waves

on Spectrum

This program demonstrates a simple practical use for your Spectrum. Using an In

instruction the computer will display a waveform of the sound it finds there.



The above are sample print outs from my sound wave program. Music etc. should be fed in through either the ear or mic sockets at the rear of your spectrum and the program run. It will produce a waveform like one of the above (taken from 'DARE' by the Human League.

Copies of a wave can be made using 'COPY' on a ZX-printer

```
10 REM SOUND WAVES
20 REM © 5.Lathrope
30 REM 10:182
40 REM
50 LET z=130: PLOT 0,z
50 FOR n=0 TO 252 STEP
70 LET z=(IN 65022)/2
60 DRAW 2 ,z-9
90 LET z=y
100 NEXT n
110 CLS : GO TO 50
```

Sound waves by Steve Lathrope

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Monte Carlo

on BBC

This program is like the arcade game Turbo. You have to dodge the oncoming cars while travelling towards a city. At the end your score and the hi-score is shown.

Program notes

The scrolling is done in a text window in line 120. This means that only a section of the screen is scrolled.

Difficulty can be increased by changing the Rnd in line 220. Sound effects can be added. For example, line 215 can be inserted as follows:

Sound 1,0,210,1:Sound 0,-15,3,2 As it stands the program runs in about 2K on a BBC model B in Mode 1.

```
10 REMARKARAKARAKARA
                                                                         350 COLOURS
                                                                         360 FORA=12T028
 20 REM** MONTE CARLO **
     REM**D. RUEGG RGE12**
                                                                                  READB
 20
                                                                         370
 40 REM** MAY/JUNE83
                                                                                  FORC=14TOB STEP-1
                                                                         388
 50 REM**********
                                                                                     PRINTTAB(A,C),CHR$224
                                                                         390
 60 SCORE%=0:HISCORE%=0
                                                                                     NEXTO
                                                                         400
 70 XX=640: YX=20: LEFTX=0: RIGHTX=0
                                                                                  NEXTA
                                                                         410
 80 MODE7: VDU23; 8202; 0; 0; 0; PROCINTRO
                                                                          420 RESTORE
80 MODE7*VDU23;8202;0;0;0;*FR00:INTR0
90 MODE1*VDU23;8202;0;0;0;*SCOREX=0:*FX11;0
100 VDU23;224;255;195;195;255;255;195;195;255
,255;23;226;255;24;189;255;153;0;0;0;23;
228;255;255;255;255;255;255;255
                                                                         430 GCOL0,2:MOVE0,0:MOVE0,544:PLOT85,544,544
                                                                               MOVE384,0:PLOT85,0,0:MOVE736,544:
                                                                               10VE1280,544:PLOT85,1280,0:MOVE896,0:PLOT85,
                                                                               736,544
     PROCSCREEN
                                                                         440 GCOL0,1:MOVE640,0:FORL=0T0512 STEP32:
110
     VDU28, 17, 31, 22, 16
                                                                               DRAW640, L : NEXT
120
130 PROCLINES
                                                                         450 ENDPROC
140 GCOL0, 2: VDU5: MOVEX%, Y%: PRINTCHR$226
                                                                         460 DEFPROCERASH
150 AS=INKEY$(0)
                                                                         470 FORD=15T00 STEP-1 SOUND3,-D,20,5 NEXT
160
     IFA$="Z" AND XX>544 THEN XX=XX-32:LEFTX=1
IFA$="X" AND XX<704 THEN XX=XX+32:RIGHTX=1
                                                                               TIME=0:REPERT UNTIL TIME=300
IF SCORE%>HISCORE% THEN HISCORE%=SCORE%
                                                                         480
179
                                                                          490
                     THEN GCOLO, 0: VDU5: MOVEXX+32, YX:
                                                                         500 ENDPROC
180
      PRINTCHR$228
                                                                          510 DEFPROCINTRO
                                                                         520 PRINTTAB(4,1); CHR#132; "SCORE= "; SCORE%; TAB(20,1); CHR#132; "HI_SCORE= "; HI6 ORE%
190 IF RIGHT%=1 THEN GCOL@, 0: VDU5: MOVEX%-32,
      YX: PRINTCHR$228
200 LEFT%=0:RIGHT%=0
                                                                         530 FORDOUBLE=4T05:PRINTTAB(9,DOUBLE);CHR$1
41;CHR$131;"MONTE CARLO":NEXT
     VDU4 : PRINTTAB( 0, 0); ""; : VDU11
220 IF RND(4)=1 THEN PROCNEWCARS
230 IF POINT(X%, Y%)=3 THEN PROCCEASH: GOTO70
                                                                          540 PRINTTAB(10,7), CHR$130; "by D. Rue99"
                                                                         550 PRINTTAB(4,10); CHR$129; "Dodge the oncoming cars to"
240 GOT0130
                                                                         oncoming cars to"
560 PRINTTRB(4,12);CHR#129;"score Points."
570 PRINTTRB(4,15);CHR#133;"Controls-:";TAB
(8,18);CHR#134;"Z = LEFT X = RIGH]"
580 PRINTTAB(10,21);CHR#157;CHR#132;CHR#136
;"PRESS BAR ";CHR#156
590 W#=GET#:IFW#<>" " THEN 590
250
     DEFPROCLINES
     GCOL0,1:MOVE640,480:DRAW640,512
260
     ENDPROC
280 DEFPROCNEWCARS
     N=RND(6):SCORE%=SCORE%+1
300 GCOL0,3: VDU5: MOVE512+(32*N), 480: PRINTCHR$
      22€
                                                                         600 ENDPROC
310 ENDPROC
                                                                          610 REM********
                                                                         620 DATRI2,11,11,11,10,10,10,9,10,10,9,9,10
,10,11,11,10
320 DEFPROCSCREEN
330 VDU19,1,6,0,0,0,19,3,5,0,0,0,19,2,2,0,0,0
340 GCCL0,1 MOVE0,544 MOVE0,1024 PLOT85,1280,
1024 MOVE1280,544 PLOT85,0,544
                                                                               REMXXXXXXXXXXXX
```

Monte Carlo by David Ruegg 3

3

3

35

40

40 40

40

40

41

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50 51

4-10/

Bomb Disposal

on VIC20

This game requires a Vic20 with a 3K expansion fitted.

You are a bomb disposal expert and have to defuse six bombs which are located in a street. You are in your car which has a steering fault. The car circles unless a key is held down, in which case the car moves off at a tangent and resumes the clockwise circular action as

soon as the key is released.

If you collide with anything other than a bomb you will lose one of your three lives the number of which are shown top right. Also if you take too long (over a minute), the bombs will explode and you will lose another life.

Before each life you have four moves in any direction to make sure that when the car starts circling it does not hit someone. Once you have defused all the bombs you receive a bonus and six more bombs and more shoppers, making the game harder.

During the game if you wish to stop the

action press '←'. To restart press any key.

Program notes 7-300

Setting up variables and screen 310-380 Four moves before starting routine 382-730 Main body of the program 740-860 Instruction 900-930 Cleared sheet routine

2000-3200 Hi-res graphics and letters 5000-5090 Sound and graphics display for explosion

The screen is headed by hi-res score, time-left and lives, below which is a bordered street with people, the bombs and your car.

```
30 SC=0:C=30720:SK=5:S=36875:LL
1 GOSUB740
                                          40 POKES+3,15:W=1
 GOT03000
                                             PRINT" IN
 POKE650,255:R(1)=1:R(2)=22:R(3)=-1:
                                          50
                                                                           W 1"
  R(4) = -22
                                          60
10 POKE36879,8:C(1)=131:C(2)=132:C(3)
                                             FORN=0T017
                                          70
   =133:0(4)=130
                                          80 PRINT" IN
                                                                           181";
20 PRINT"]":D(1)=-21:D(2)=23:D(3)=21:
                                          90 NEXTN
                                          100 PRINT" IL
                                                                           JE 1":
   D(4) = -23
```

110 PRINT" ";	730 RETURN
111 POKE8185,75: POKE8185+C,5	740 PRINT"3":POKE36879,25
Total Forth Otor	749 EODN-GTOST: DOVETCOGEN 160: DOVE
120 FORN=0105 130 GOSUB2000 150 POKE7724+A,128 160 POKE38444+A,7 170 POKES,(A/4)+128 180 NEXTN 190 POKES,0 200 FORN=0TOSK 202 B=6	38400+N, (NAND7):POKE8164+N, 160:
150 0030022000 150 00057724+0 120	POKE38884+N, (NA
150 POKE7724+A,128	ND7):NEXT
160 POKE38444+R,7	750 PRINT" SOUR DEPARTMENT SQUADARENTE
170 POKES, (A/4)+128	
180 NEXTN	760 PRINT"XXXXY-UPXXXXXXXXDXB-DOWN"
190 POKES,0	770 PRINT"MG-LEFTMUNNUMH-RIGHT"
200 FORN=0TOSK	780 PRINT WOMENFTER FOUR INITIAL
202 B=6	MMOVES ANY KEY WILL
210 GOSUB2000	WISEND THE CAR OFF AT A "
230 POKE7724+H,129	790 PRINT"MTANGENT."
240 POKE38444+A,2	800 RETURN
250 POKES+1,(A/4)+128	250 FORN=GTO150:NEXTN
260 NEXT	OSG DETUDA
270 POKES+1,0	000 KETUKH .
280 GOSUB2000	900 3C-3CT300
290 TI\$="000000"	310 3K=3K+1
300 P=A+7724:Q=1	920 FURN=2341U22051EF-1 FURES+3,13
310 FORN=1T04	PORESTIN MENT PURESTING
315 POKEP, 130	238 001048
316 POKEP+C, 1	2000 H=1N1(KND(17#462)
320 GETR\$	2010 IFFEEK(H+//24/C)32/HENW=W+1.
325 TEA\$=""THEN320	00102000
210 GOSUB2000 230 POKE7724+A,129 240 POKE38444+A,2 250 POKES+1,(A/4)+128 260 NEXT 270 POKES+1,0 280 GOSUB2000 290 TI\$="000000" 300 P=A+7724:Q=1 310 FORN=1T04 315 POKEP,130 316 POKEP+C,1 320 GETA\$ 325 IFA\$=""THEN320 326 POKEP,32 330 IFA\$=""THENP=P-22:A=P-7724: GOSUB2010	ZUZU KETUKN
220 TERE="U"THENP=P-22:A=P-7724:	3000 FORN=5120T07160: POKEN, PEEK (27648+
GOSUB2010	N):NEXT
240 TEO#-"D"TUEND-D+22:0-D-7724:	3010 LOKU-0144100503
GOSUB2010	3020 READA: POKEN, A: NEXT 3030 DATAGO, 60, 24, 60, 126, 126, 60, 24
350 IFA\$="G"THENP=P-1:A=P-7724:	3030 DATA60,60,24,60,126,126,60,24
200 ILUA- 0 LUCUL-L-1 . U-L-1154.	3040 DATA24,90,126,24,24,60,36,102
GOSUB2010 360 IFA\$="H"THENP=P+1:A=P-7724:	3050 DATA60,60,126,66,60,126,66,60
350 IFH\$="H" HENF=F+1.H=F-7724.	3050 DATA60,60,126,66,60,126,66,60 3050 DATA60,60,126,66,60,126,66,60
GOSUB2010	3070 DATA60,66,126,60,66,126,60,60
370 IFQ>1THENGOSUB2000:P=A+7724:Q=1	3080 DATA0,54,237,237,237,237,54,0
380 NEXTN	3090 DATA0,238,136,136,232,40,40,238
382 FORN=1TOLL:POKE7697+N,130:NEXT	3100 DATA0, 238, 170, 174, 172, 172, 170, 234
385 T=60-VAL(RIGHT\$(TI\$,2)); IFT=2THEN	3110 DATA0,224,142,128,192,142,128,224
5000	3120 DATA0,234,75,75,74,74,74,74
390 PRINT"過間級FGH豐淵";SCTAB(11);"問間J線	3130 DATA0, 184, 160, 162, 176, 162, 160, 184
I INDI"; T	3140 DATA255, 129, 129, 129, 129, 129, 129,
400 GETA\$	255
401 TERE-"4"THENRESTIE: POKE198.0: WAIT	0150 POTOS 100 60 60 60 60 100 8
198.1:TI\$=R\$:GOTO400	2160 DOTOO 0.60.36.36.60.0
402 TER=0THEN900	2170 TOTON 0 0 24 24 0 0 0
403 TEAS=""THENGOSURZOG: GOTO400	3190 POKESERES, 253
404 TEVAL (TT\$)=100THEN5000	0100 PONESCOOT 200 10 DONESS OFF
495 POKEP 32	DUNCES 10.01 D
410 P=P+P(H)	COOC COTOS
198,1:TI\$=B\$:GOTO400 402 IFB=0THEN900 403 IFA\$=""THENGOSUB700:GOTO400 404 IFVAL(TI\$)=100THEN5000 405 POKEP,32 410 P=P+R(W) 420 IFPEEK(P)<>32THENGOSUB450 430 POKEP,C(W):POKEP+C,1 440 GOTO385	3200 60107
420 POVED COLLY DOVEDTO 1	5000 PUKES+4,25
440 COTOSE	SUIU FORE=UTO200:NEXTE
450 IFPEEK(P)=128THENSC=SC+100*SK:	5020 POKES+4,8
430 1FFEEK(F)=128 (HENSU=3U+100#SK.	5030 POKES+2,220:POKES-1,128
G0T0470	3040 FORN=15T00STEP05
460 GOTO5000	5059 POKES+3,N
470 FORN=230T0254	5060 NEXTN
480 POKES+1,N	5070 POKES+2,0:POKES-1,0
490 POKES+3,15	5071 POKEP,139:GOSUB850:POKEP,140:
500 NEXT	GOSUB850: POKEP, 141: GOSUB850:
510 B=B-1:RETURN	POKEP,142:GOSUB850
700 POKEP,32:W=W+1:IFW=5THENW=1	5072 POKEP, 32
710 P=P+D(W): IFPEEK(P) <>32THENGOSUB450	5075 W=1
720 POKEP,C(W):POKEP+C,1	5080 LL=LL-1
721 IFTI\$="000100"THENGOT05000	5085 IFLL=OTHENPRINT"###############
722 T=60-VAL(RIGHT\$(TI\$,2))	GAME OVER": POKE198,0:WAIT198,
723 PRINT"SINFGHEM"; SCTAB(11); "SHIJ	1 : RUN7 Bomb Disposal
	5090 GOTO40 by Benedict MacCarty
725 FORN=0T0100:NEXTN	by belieuici waccarty

4-10 AUGUST 1983

ore, a a

KLY

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Tony Bridge's Adventure Corner



Zodiac adventure

his week, I want to look towards the Oric 1. As I said in my review of the machine in PCW 13 January, the Oric or any new machine - will only thrive if supported by good software. And I don't mean another version of Frogger or Scramble (although a version of Zaxxon would be welcome!).

The Oric seems to be, gradually, attracting software houses, and Tansoft, in particular, appears to be doing rather well at the moment in supplying different pro-

Following on from my look at the letter from Mr Fletcher, a couple of weeks ago, a few people have written to me in reply. If

grams for the new computer.

you follow this column, you'll remember that Mr Fletcher had done quite well in the Zodiac Adventure, for the Oric, having collected five Treasures and 10 signs. I thought then that it was too good to be true, and W J Bailey informs me that, indeed, there are only six signs to find. Apparently, there are several red herrings. If you should be in the middle of this adventure, you might like to know that The Ram and The Scorpion are both bogus treasures, according to Mr Bailey. However, he, like Mr Fletcher, has only found five treasures.

Roger Grimshaw also writes in regard to the Oric and, more particularly, the Zodiac

Adventure. As far as I know, this is the only adventure for the Oric so far available, so it's not surprising that I get a lot of letters on the subject! Roger has only collected five of the treasures, but has some ideas on cracking the safe, which is where Mr Fletcher was stuck.

Jim Gibson wrote to me from Harrow, about The Zodiac, and told me of his wife Shelagh, who spotted the Corn from Capri well, Jim, it doesn't mean anything to me, I hope that it means something to somebody! Jim suggests that to get to the safe you need an expert. He also says: "How about a review of Zodiac?" Yes, Jim, how about a review?

Lalso received a letter from G M Phillips. who actually wrote the adventure for Tansoft. He also offered advice for Mr Fletcher on cracking the safe. The consensus of opinion seemed to lean towards asking somebody else to crack the safe for you, Mr Fletcher. Isn't there a jail somewhere nearby?

Roger also has a few hints to give to people stuck in The Zodiac who have been thrown into jail and are being asked awkward questions. The best answers to give are:

- 1 any colour but blue
- any number but nine
- 3 SEOUL

And finally I must add that this program is not the A+F version.

Rushing into the nearest photo booth, to change computers, I received a plea from S Lowe, asking for help in Faust's Folly, from Abbex. This adventure is for the 16K or 48K Spectrum. Mr Lowe would like to know how to get past the wheel at the beginning of the game. Have you tried twisting the wheel, Mr Lowe?

Faust's Folly is a text game, but supported by little one-character graphics appearing beside the description of each location. I haven't progressed very far with it, myself, and I would welcome any advice that you can offer. I hope to have a closer look at this adventure at a later date.

Pausing only to sidestep an Oric, I'll change computers again and ask my colleague Brian Cadge to look at an adventure for the Dragon - Madness and the Minotaur.

"This is one of Dragon Data's own offerings (although it was actually written by Spectral Associates). It is a machine code, text only, adventure. The manual supplied is fully comprehensive and describes the program as a "Classic adventure game" and such it is. The usual two word commands are given - 'Get Lamp', 'Look Bottle' etc, as well as a number of magic spells such as 'Belrog' which can be cast to perform various unexciting things like dispelling fog. Abreviations are not allowed, except for North, South, etc.

'Typing 'Help' only ever seems to provoke the reply 'Don't ask me - you got yourself into this mess' - perhaps this appeals to the American sense of humour (colour is also spelt color and centre is spelt center - couldn't they have updated this for the British market?) The object of the game is, of course, to collect all the treasures and kill the monsters. The program is in 'Real Time' - frequently, when you have half typed a command, it will interrupt to say you have been killed or are being attacked. The only use of sound is the occasional warning beep.

"Dragon Data claims the program is an adult adventure game. Playing the game. one can see why it wouldn't appeal to younger users - the lengthy descriptions and long command words are not a good feature for children. There is no facility to save the game so far completed, no graphics, very little sound and you cannot create your own custom character. All in all. I cannot enthusiastically recommend the game to anyone. Madness and the Minotaur is available from Dragon dealers at £7.95.

In the meantime, as R Miller, of Newark, warns me: Never take Jabber the Hutt out to dinner (his manners are awful!).

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF

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- (3) Closing date for competition entries is September 1, 1983.
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ORIC CONVERSION

David Lee of Valnay Road, Tooting, London, writes:

Q A few years ago my father bought several computer and electronic magazines back from America. Apart from the fun of seeing how far computers have come in just a few years, there are some programs in them that I have tried to convert to my Oric.

Generally I have not had many problems; however, two commands which are not used a lot have me baffled. They are Ne and Sleep. Can you help?

A Ne is either a short version of New or a form of not equal to' which we know and use as the sign<>. You have to work out which one applies to the program from the context, although I would suggest that if it occurs within a program especially if part of a numerical statement, then it would be 'not equal to'.

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Sleep is like a Pause statement. It simply stops the program running for a certain length of time. The length, probably tenths of a second, is defined in the number that follows the command.

COMMAND

Siad Atihas of Edward Street, Werneth, Oldham, Lancs, writes:

Q I have recently bought a BBC computer and have learned to do many things on it. But, could you tell me how to use the *Point* command to see whether two objects have hit each other on the screen? Could you give me a small program that will show how this is done? Also, is there any

other command that will do the same?

The Point command returns the colour of the screen as a particular set of co-ordinates, (x, y). So, you would have to set up a pair of co-ordinates and then read them to see if they returned the same value as the item that is trying to dodge them. So, for example, if your missiles had the colour a, and it was in the same place as an invader. colour b, then you have hit the alien. A line If Point (x, y) = bThen . . . would take you to the 'hit' routine. A line If Not Point (x, y) = b Then . . . would carry on with the program.

There is an alternative, which is to use the call Fx 135. This is described on page 432 of the manual, along with other Fx calls. This returns the character at the current cursor position. By reading this, yoù can work out whether or not a missile and invader are trying to occupy the same location on the screen.

SPECTRUM SCRABBLE

R Walker of Church Street, Blaenau Festiniog, Gwynnedd, writes:

I have a 48K Spectrum and am well pleased with it. My family and I are keen Scrabble players, and I would like to know if there are any good Scrabble programs available for the 48K Spectrum. If so, how many can play, and can the computer play?

A Psion has just brought out a Scrabble program in conjunction with Little Genius. It is an amazing achievement, with an 11,000 word vocabulary. It plays the full Scrabble rules, and up to four people can play. You can use the computer to just keep score, and maintain the board, or it can act as one of the players. You should be able to find it in W H Smiths.

COMMODORE PROGRAMS

Robert Willoughby of Dunsford, nr Exeter, Devon, writes:

Q I have recently bought a Commodore 64. It is difficult to find magazines with programs for this computer in them. Please could you tell me if there are any magazines with programs for this computer, or are you going to print some in your magazine?

A The Commodore 64 has taken a few months to become established on the market. However, with its new low price I am sure that it will be a success.

We have every intention of covering it in greater depth than we have up to now (see the Commodore 64 page in this issue). Remember, we carried a review of the computer before it was released, way back at the beginning of September last year.

HISTORICAL

Christopher Snow of Brook Gardens, Compton Greenfield, nr Bristol, writes:

Q Could you please tell me when the first computer was made?

Assuming that you are going to ignore such things as the abacus, the Inca qupiu, and other adding, calculating aids, I will quote you a line from Myth of the Micro by Rodney Dale and Ian Williamson: 'The early years of computers and electronics are full of such contradictory claims...'

What I will do is simply give you a list of important dates and achievements. 1614 -Napiers Bones - is an important date, and by the end of that century, Pascal and Leibnitz had both developed mechanical calculators. By the 1800s the slide rule as we know it, had been developed. In the 1820s Charles Babbage had started on his 'Difference Engine' which many people regard as an important precursor to the electronic computer. This was further developed into the Analytical Engine' with the help of Lady Lovelace.

By the early 1930s, several very powerful mechanical calculators had been developed in America. These were essentially just better versions of early adding machines made possible by better use and control of metals. In 1937 Stibitz used a series of relays and light bulbs to add two binary numbers.

The final impetus came with World War Two, and it seems that the British won, very much under the guidance of Alan Turing, who developed the concept of the Algorithm. The machine was called Colossus and the date was 1943. Until quite recently, the Americans had claimed the start with Eniac which was finished in 1946. Colossus was only revealed after the 30-year period demanded by the official secrets act expired.

BBC MANUAL

Lee Dobson of Barnard Avenue, Coal Aston, Sheffield, writes:

I have a BBC microcomputer, model B. I
have recently upgraded the
operating system from 0.1 to
1.2 Rom (though the 0.1 said
Eprom on the screen). As you
do not get any sort of extra
manual, or leaflet with the new
Rom, I am having difficulty
learning some of the new
commands, namely Plot and
Fill. Some I have found out for
myself, but could you advise
me where I could get the information I want?

A The commands are in the manual and, from what you say, I can only presume that you still have the old provisional manual. All the replacement manuels should have been sent out by now, though I do not think that anyone would be too surprised if some had been 'misplaced'.

Acorn are in fact meant to be re-issuing the manual sometime, though I, for one, will believe it when I see it. Until then, I can only suggest you supplement what is in the manual by keeping an eye on the magazines, particularly those dedicated to the BBC.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to lan Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW,* Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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NEW RELEASES

CARDS



If software houses don't reease Mastermind or Space Invaders when they begin operating, then they release versions of card and other gambfing games.

One such company has deoded to do just that for the ZX81 - so if you fancy playing Poker, Dominoes or Brag you can get any two for £2.35 on one cassette.

AD

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Program Poker/Dominoes/Brag Micro ZX81 16K W Jefferson Supplier 29 Arundel Walk Pelton Chester-Le-Street

Co Durham

STARRED

Things to do with your Spec-

trum other than kill aliens

number nine: learn astrology.

Now I know there are a lot

of computer buffs who are not

very keen on unscientific

things like astrology; they are

even less keen on using com-

puters for astrology - oh the

degradation! So, I apologise in

advance to anyone who may

feel upset when I say that

Astrocale specialises in astrol-

Astrocalc has a number of

packages for a series of micros

including Spectrum and

Astrotutor is a series of five

cassettes which teach you all

ou need to know about

individual units varies, but the

complete set is available for £20.

Program Astrotutor Price £20 Micro Spectrum 48K Terry Dwyer Supplier (Astrocalc) 53 Loughborough Road Loughborough LE12

IMPOSSIBLE

And All Because must be the first game ever to have been inspired by an advertisement.

There are nine different screens, in each of which you have to accomplish some impossible task like motorbiking down a ravine, or hang-gliding over a ledge - and all because you want to deliver some chocolates to your girlfriend.

Whether this will be as powerful a motivation towards brave deeds as saving the world from aliens remains to be seen.

Program And All Because Price £6.95 Micro Dragon 32 Supplier B&H Software 208 King Street Cottingham Hull

A CLASSIC



If you have an 8K or 16K Vic then now you can play Galaxians on it. What do you mean,

you are already? Some people will not have a copy of the classic aracade game, where you blast away at birds which flutter around. Now, there is another version to choose from.

Cosmic Fire Birds from Solar Software has all the features, like 99 levels, demo version and bonuses and is written entirely in machine

Program Cosmic Fire Birds Price Micro Supplier

£9.95 Vic20 (8/16K) Solar Software 51 Meadowcroft Radcliffe

Manchester M26 0JP

SPECIALISED

Some of the programs I'm being sent these days for the Spectrum are pretty special-

Placet Software's Aerofoil Directory is for makers of model aircraft. It is intended to assist design by maintaining aerofoil data in an accessible form and by providing a facil-ity for quickly calculating the dimensions of wing ribs.

OK. I'll be honest. I don't understand any of that last paragraph, I stole it from the press release. However, I'm sure all model aircraft fans will understand it.

Program Aerofoil Directory Price £4 05 Spectrum 16/48K Micro

Placet Software 24 Marl Road Supplier Radcliffe-on-Trent Nottingham NG122GY

IMPROVED

It may come as a shock to some people to realise that the BBC B's Basic could actually be improved — that anyway is the opinion of Vachettes Mic-

Its system, which will only work on the B with the OS1 2, includes functions like Circle and procedures like Popgos, which will delete from memory the last Gosub return address so that you can jump out of subroutines.

There are plans to increase the commands available on subsequent versions.

Program BBC Extended Basic V

Price £5 50 BBCB (OS 1.2) Micro Supplier Vachettes Micros

Marshborough Sandwich Kent CT13 0PG

HISTORY

The latest book from the National Computing Centre is Introducing Computers by Malcolm Peltu.

The book is intended to be a comprehensive guide to the history of computers and their development. It also includes sections on the various uses to which computers are put.

It's a mark of something or other that this book retails for £5.50 and has 326 pages with various pictures and plates, whereas most computer books cost £5.95 for not much over 100 pages.

Introducing Computers Book Price £5.50 Micro General NCC Publications Supplier The National Computing Centre Oxford Road Manchester M1 7ED

PILOT



ISCA Software is a company producing games for Vic20. Its first release is Warrior, the scenario for which will seem strangely familiar.

You must pilot your light cycle around the screen, avoiding light trails and pylons. If you reach a purple power point you gain 100 points; if the robot warrior reaches one you lose 100 points.

The game will work either with a joystick or the keyboard.

Program Warrior Price Vic20 Micro Supplier ISCA Software 56 Whitchurch Ave Exeter EX25NT

planets, signs, houses, aspects, etc. and then tests you on your knowledge. The price of the

WEEKLY 410 AUGUST 1983

ogy programs.

STRUCTURED



The BBC educational market seems to be getting into gear with the release of a number of professional (and expensive) products.

A company which seems to be specialising in this field is ASK Software, which has just released five educational packages for the BBC B.

The packages are adapted from programs written originally for the Vic and are mostly written in Basic.

Facemaker teaches sentence structure in the form of an Identikit picture of various mouths, noses, ears and hats,

etc. Reading the name of each feature, together with an associated description, is supposed to help powers of description.

Program Facemaker Price £0 05 Micro

BBCB Supplier Applied Systems Knowledge London House 68 Upper Richmond Road London SW15 2RP

POOLED

At £200, or thereabouts, the Commodore 64 will be a very competitive machine - small wonder then that the news of the price drop has meant a significant increase in the amount of new software on

Bubble Bus has a version of pool for the 64 called Hustler it uses machine code and sprite graphics and offers six games for either one or two players.

This is the first of a range of software the company intends to supply for the 64.

Program Hustler £5 99 Price Micro

Commodore 64 Supplier Bubble Bus



The Computer Room 87 High Street Tonbridge Kent TN1 1LS

SHUTTLE

4 Mat specialises in educational software for the BBC computer.

Spacex places you in the Golden Hind - a space research vessel. You have jaunted off in your space shuttle to visit the Kleptoes semi-intelligent species who collect things and hide them.

Somehow all this has strong educational implications the fact that they are not obvious may be a sign that it actually works.

Program Spacex £10 Price Micro BBC

4 Mat Educational Supplier

Software Linden Lea Rock Park Barnstaple Devon EX32 9AO

LANGUAGE

CP Software is well known for its range of computer versions of classic board games.

Snail Logo is an unusual release, in that it is essentially a language - a language particularly well suited for the construction of geometric patterns hence its association with the turtle

This is not the only version of the language available, but it is the first available for the Spectrum - it is the first moreover that actually has a displayable snail!

The price of £9.95 includes a manual which acts as a general introduction to the language.

£9.95 Price Spectrum 48K Micro CP Software Supplier 17 Orchard Lane Great Missenden Bucks HP16 0NN

Program Snail Logo

MINIMALIST

Some new releases deserve a minimalist approach.

Gamespack. Spectrum. Cardgames. Hangman. Funfair Software.

Price Micro Supplier

Program Braingames £5.00 Spectrum 16/48K

Funfair Software 82 Lees Gardens Maidenhead Berkshire

PREHISTORIC



If your reputation consists o Penetrator and The Hobbit it can't be easy to decide what to do next.

Melbourne House has been strangely silent, at least on the Spectrum front, for some months now. Rumours o adventure games abound (be you anything you like it isn't Lord of the Rings) but mean while something more tangible has emerged.

Terror Daktil 4D is a arcade style game in which, to simplify things slightly, you or the m fire at prehistoric birds. What is unusual is the way 3D tech of a diffe niques are used to give you the impression the bird is rushing towards you.

Although this is not uniqu (see 3D Tunnel for example great things are claimed for the graphics.

Program Terror Daktil 4D Price £6.95 Spectrum 48K Micro Melbourne House Supplier

Glebe House Station Road Cheddington Leighton Buzzard Bedfordshire IU7-7NA

New Releases is designed to let people know what software BBC is coming on to the market. you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases Popular Computing Weekly 19 Whitcomb Street, London WC2 7HF

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London



BCPL and Forth

A computer's memory is arranged in a linear sequence, one memory location followed by another in some numerical order.

BCPL and Forth are both languages which use this ordering to good effect.

BCPL, like most other programming lan-guages, can set up an array of elements. Only one-dimensional arrays are provided, called vectors". To make a vector of 16 elements (of name VV) the BCPL declaration would be: LET VV = VEC 15

and to distinguish the (say) 7th element of VV we write VVI7. The "!" is pronounced "pling" in BCPL - as it is in BBC Basic (User Guide.

The BBC Basic, VVI7 is not the same as W(7): the first is the 7th element of the word vector VV, and the second is the 7th element of the real array VV. There are two different forms of declaration:

10 DIM 15 : REM WORD VECTOR 20 DIM VV(15) : REM REAL ARRAY |

The BCPL declaration Let VV = Vec 15 sets up a vector of 16 successive locations, and the sparse between the section of the section of the vector. VV "points" to the first leating of the vector. VV "points to the second VV+1 points to the second element (ie, V+1 is the address of the second element of the vector). "I" is placed in front of the variable to produce the contents of the element stored at that location. That is, IVV refers to the value at the beginning of the vector or VVIO). To refer to the second element along, we can either write the cumbersome !(VV+1), or the more compact VV!1. The content of the second element, say, could itself be an address of a different location and, therefore, it is very

easy to produce linked lists.

This system corresponds exactly to the use of memory and pointers in Forth, where there are elements in memory (called "cells" just as in BCPL) and each location can be regarded as itself being a pointer to other locations

Systems programming languages, such as BCPL or Forth, have to provide such flexible methods of controlling memory use to be successful.

BBC Basic has three forms of indirection: 1, ?,

The difference between the three forms of indirection in BBC Basic is what each form considers to be its own basic element. For ! (pling) the basic element is four bytes (which exactly corresponds to an integer for the BBC). In the case of ? (query) the basic element is one byte (?VV is used, inter alia, as the BBC version of Peek and Poke). And, finally, the \$ (dollar) takes as its basic element a series of locations terminated by the value hex OD (and treats the locations as characters). Following the Dim VV 15 statement above we cannot refer legitimately to VV!7, because the pling assumes four bytes a time: we can refer legitimately to VV!0 (or !VV). VV!1, VV!2, and VV!3 (or ?VV to VV?15).

To indicate how this might be used, I will take an example from an article on graphics for the BBC computer. The authors set up a 500 element real array (for a computing technique called a "queue"). They effectively had written: 1000 DIM VV(500) : REM Takes up 2500 bytes

which in itself took up 2.5K. What numbers were they storing? They were storing co-ordinates on the high-res screen (maximum value 1279), for both X and Y-5K in all. The number 1280 can be accommodated in two bytes (1280 = 5×256 + 0×1), and so why not define a byte vector 1000 bytes long? All it needs is:

1000DIM VV 999 : REM Takes up 1000 bytes

to save 3K overall — with an increase in speed as byte vectors are more efficient.

It is true that we would have needed to define a couple of special routines to cope with two bytes at once, but that is easy enough. Eg, to produce the number from two bytes:

1000 DEF FNvalue(XX,I) = 256*XX?I + XX?(I+1)

It seems clear that many experts (often raised via a language called Pascal) do not appreciate the power of BBC Basic, but get carried away by its more obvious advantages.

Boris Allan

Puzzle

Cassette prize

Puzzle No 67

Jamie needs help with a problem. He was given a set of four wooden blocks, like dice only with numbers instead of dots. His friend offered him a financial incentive to take more interest in the blocks. "Work out the sum of all the four-digit numbers possible with them and I'll give you one of my computer cassettes for every million in the total." He himself had been set the puzzle by his teacher, but preferred that Jamie was the one to put in the effort.

Can you help Jamie? No digit can be used more than once in any number - but the six may be inverted to form a 9.



Solution to Puzzle No 62

Oops! Horror of horrors, an error in the question to this puzzle!

Instead of 0 representing a zero in the seventh equation — $\sqrt{\text{EEEEEE}} = \text{EEOE} - \text{O}$ was meant to indicate an odd number. So, with the puzzle as was there was no possible solution to the seventh equation. The rest of the puzzle could, however, be solved using a program:

| 10 FOR N = 2 TO 8888 STEP 2 20 LET S = N + N 30 LET S\$ = STRS S 40 FOR F = 1 TO LEN S\$ 50 IF VAL (SS(F))/2 - INT (VAL(S\$(F))/2) <> 0 OR S\$(F) = "0" THEN GOTO 80 60 NEXT F

70 PRINT "Number"; N, "Root"; S 80 NEXT N

This gives the answers:

 $\sqrt{4} = 2$, $\sqrt{64} = 8$, $\sqrt{484} = 22$, $\sqrt{4624} = 68$, $\sqrt{68644} = 262$, $\sqrt{446224} = 668$ and $\sqrt{44462224} = 668.$

Winner to Puzzle No 62

The winner is: C Hembrough, Tweed Grove, Hull, who receives £10.

Top 10 Top 10 Top 10 Top 10

Service Control	Marie Control	
xample),	ZX81 1 (3) QS Scramble	(Quicksilva)
	2 (1) Football manager	(Addictive Games)
	3 (8) Defender	(Quicksilva)
	4 (2) Flight Simulation	(Psion)
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The state of the s	f (6) 1K Games	(Artic)†
	7 (5) Fantasy Games	(Psion)
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oft)	6	(6)	Panic	(Bug-Byte
al)	7	(5)	Race	(Commodore
al)	8	(8)	Amok	(Audiogenic
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EASTERN TERMS	
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1 (1) Snooker	(Acornsoft)
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(3) Killer Gorilla	(Program Power)
1 (-) Missile Base	(Acornsoft)
I (-) Bug Bomb	(Virgin Games)
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(4) Moonraider	(Program Power)
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Boo	ks	
1	(4)	Commodore 64 Programmers Reference Guide, Commodore
2	(1)	Structured Programming with BBC Basic, Atherton
3	(2)	Assembly Language for the BBC Micro, Birnbaum
	(-)	
5	(9)	Complete Spectrum Rom Disassembly, Logan
6 ()	BBC Micro Book, Basic, Sound and Graphics, McGregor
7	(6)	6809 Assembly Language Programming, Leventhal
8 (10)	Forth on Your BBC Microcomputer, de Grandise-Harrison
9	(7)	Vic Programmer's Reference Guide, Commodore
10 (-)	Z80 Assembly Language Subroutines, Leventhal
		(Figures compiled by Watford Technical Books.

(Norwood)	
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10		Dragon Trek	(Winterso

(Last week's position in brackets)

